BROOKLYN BOTANIC GARDEN RECORD

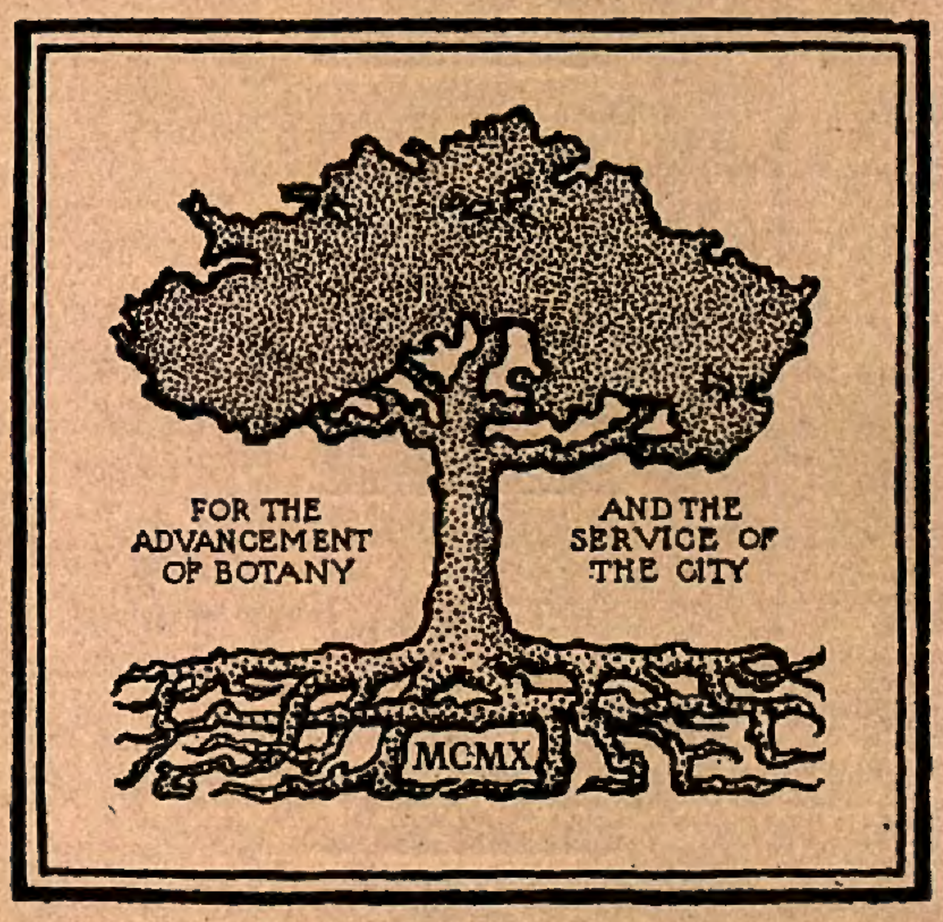
VOL. XXV JANUARY, 1936 NO. 1

CONTENTS

DELECTUS SEMINUM

BROOKLYN

1935



PUBLISHED QUARTERLY
AT PRINCE AND LEMON STREETS, LANCASTER, PA.
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

Entered as second-class matter in the post-office at Lancaster, Pa., under act of August 24, 1912

BROOKLYN BOTANIC GARDEN

Scientific, Educational, and Administrative Officers

SCIENTIFIC AND EDUCATIONAL

The Staff

C. STUART GAGER, Ph.D., Sc.D., Pd.D., *Director*
———————, *Librarian*
MONTAGUE FREE, Certificate, Royal Botanic Gardens, Kew, *Horticulturist*
ARTHUR HARMOUNT GRAVES, Ph.D., *Curator of Public Instruction*
ALFRED GUNDERSEN, Docteur de l'Université (Paris), *Curator of Plants*
GEORGE M. REED, Ph.D., *Curator of Plant Pathology*
ELLEN EDDY SHAW, B.S., *Curator of Elementary Instruction*
HENRY K. SVENSON, Ph.D., *Curator of the Herbarium*
MARGARET M. DORWARD, A.B., *Assistant Curator of Elementary Instruction*

Other Officers

MARY AVERILL, *Honorary Curator of Japanese Gardening and Floral Art*
HAROLD A. CAPARN, *Consulting Landscape Architect*

RALPH CURTISS BENEDICT, Ph.D., *Resident Investigator (Ferns)*
RALPH H. CHENEY, Sc.D., *Resident Investigator (Economic Plants)*

EMILIE PERPALL CHICHESTER, *Library Assistant in Charge*
ELSIE TWEMLOW HAMMOND, M.A., *Instructor*
ELIZABETH MARCY, A.M., *Research Assistant*
FRANCES M. MINER, A.B., *Acting Assistant Curator of Elementary Instruction*
HESTER M. RUSK, A.M., *Instructor*
L. GORDON UTTER, M.S., *Research Assistant*

CHARLES F. DONEY, M.S., *Curatorial Assistant*
WILLIAM H. DURKIN, *Curatorial Assistant*
MARGARET BURDICK PUTZ, *Curatorial Assistant*
MARGERY H. UDELL, *Curatorial Assistant*
HILDA VILKOMERSON, A.B., *Curatorial Assistant*

LOUIS BUHLE, *Photographer*
MAUD H. PURDY, *Artist*

ADMINISTRATIVE

DANIEL C. DOWNS, *Secretary and Accountant*
MAUDE E. VORIS, *Assistant Secretary*
NORMA STOFFEL BANTA, *Office Assistant*

MARIE-LOUISE HUBBARD, A.M., *Secretary to the Director*
GERTRUDE W. MERRILL, A.B., *Membership Secretary*
FRANK STOLL, *Registrar and Custodian*

LAURA M. BREWSTER, *Stenographer*
*PAULINE LEHMAN BROWN, B.A., *Stenographer*
CONSTANCE PURVES ELSON, B.A., *Stenographer*
EVELYN M. GAILER, *Stenographer*

* Resigned, November 1, 1935.

BROOKLYN
BOTANIC GARDEN
RECORD

VOL. XXV JANUARY, 1936 NO. 1

DELECTUS SEMINUM, BROOKLYN 1935

List of Seeds Offered in Exchange

These seeds, collected during 1935, are offered to botanic gardens and to other regular correspondents, and to members of the Brooklyn Botanic Garden. They are not offered for sale.

Applications for seeds must be received during January or February. **Latest date March 1, 1936.**

Spores of Lycopodium

Lycopodium
*clavatum L.
*complanatum L.
*obscurum L. var. dendroideum (Michx.) D. C. Eaton

SEEDS OF HERBACEOUS PLANTS

Dicotyledones

Polygonaceae 77

Polygonella
articulata (L.) Meisn.

Chenopodiaceae 78

Kochia
trichophylla Stapf

Amarantaceae 79

Amarantus
caudatus L.
flavus L.
gangeticus L.

Froelichia
gracilis Moq.

* Collected from wild plants.

Nyctaginaceae 80

Mirabilis
Jalapa L.

Phytolaccaceae 83

Phytolacca
decandra L.

Aizoaceae 84

Tetragonia
expansa Thumb.

Portulacaceae 85

Claytonia
*virginica L.

Basellaceae 86

Basella
rubra L.
rubra L. var. alba

Caryophyllaceae 87

Arenaria
caroliniana Walt.
graminifolia Schrad.
Cerastium
arvense L. var. villosum Hollick & Britt.
Biebersteinii DC.
Dianthus
chinensis L.
deltoides L.
Lychnis
alba Mill.
Silene
japonica Rohrb.
maritima With.
pennsylvanica Michx.
Zawadskii Herbich
Tunica
Saxifraga Scop.

Ranunculaceae 91

Actaea
*rubra (Ait.) Willd.
Anemone
canadensis L.
Halleri All.
sibirica L.
Aquilegia
baikalensis Hort.
canadensis L.
Clematis
*Viorna L.
*virginiana L.
Coptis
*groenlandica (Oeder) Fern. (C. trifolia of auth.)
Paeonia
corallina Retz
Thalictrum
*polygamum Muhl.

Berberidaceae 93

Caulophyllum
*thalictroides Michx.
Diphylleia
*cymosa Michx.
Podophyllum
*peltatum L.

Papaveraceae 104

Argemone
platyceras Link & Otto
Eschscholtzia
californica Cham.
Papaver
orientale L.
Sanguinaria
canadensis L.

Cruciferae 105

Alyssum
dasycarpum Steph.
Berteroa
incana (L.) DC.
Iberis
sempervirens L.
Tenoreana DC.

Capparidaceae 107

Cleome
spinosa Jacq.

Resedaceae 108

Astrocarpus
sesamoides Duby

Sarraceniaceae 110

Sarracenia
*flava L.
*minor Walt.
*psittacina Michx.
purpurea L.

Droseraceae 112

Drosera
*filiformis Raf.

Saxifragaceae 117

Heuchera
*macrorhiza Small

Rosaceae 126

Fragaria
*virginiana Duchesne
Gillenia
stipulata Trel.
Potentilla
*arguta Pursh
Hopwoodiana (hybrid)
Sanguisorba
canadensis L.

Leguminosae 128

Desmodium
canadense (L.) DC.
Dolichos
Lablab L.
Ononis
arvensis L.
Petalostemon
*Gattingeri Heller
Tephrosia
virginiana (L.) Pers.

Geraniaceae 129

Geranium
maculatum L.

Euphorbiaceae 147

Euphorbia
*polygonifolia L.

Balsaminaceae 168

Impatiens
*biflora Walt.

Malvaceae 175

Kitaibelia
vitifolia Willd.

Hypericaceae 187

Hypericum
*virginicum L.

Cistaceae 193

Helianthemum
*canadense (L.) Michx.
Hudsonia
ericoides L.
Lechea
intermedia Leggett

Violaceae 198

Viola
affinis LeConte
conspersa Reichenb.
fimbriatula Sm.
latiuscula Greene
striata Ait.

Loasaceae 206

Blumenbachia
Hieronymi Urb.

Melastomaceae 223

Rhexia
*glabella Michx.
*virginica L.

Onagraceae 224

Epilobium
*angustifolium L.
coloratum Muhl.
Oenothera
fruticosa L.
*triloba Nutt.

Araliaceae 227

Aralia
*nudicaulis L.

Umbelliferae 228

Cicuta
maculata L.
Cryptotaenia
canadensis (L.) DC.
Eryngium
*aquaticum L.
Heracleum
platytaenium Boiss.
Osmorrhiza
*longistylis (Torr.) DC.
Zizia
aurea (L.) Koch
cordata (Walt.) DC.

Primulaceae 237

Steironema
ciliatum (L.) Raf.

Plumbaginaceae 238

Limonium
lychnidifolium Kuntze

Gentianaceae 246

Sabatia
*gracilis (Michx.) Salisb.

Apocynaceae 247

Apocynum
*androsaemifolium L.

Asclepiadaceae 248

Asclepias
purpurascens L.
*syriaca L.
verticillata L.

Polemoniaceae 250

Phlox
*glaberrima L.
Polemonium
humile Willd.

Hydrophyllaceae 251

Hydrophyllum
virginianum L.

Borraginaceae 252

Onosmodium
*molle Michx.

Verbenaceae 253

Lantana
Camara L.

Labiatae 254

Cunila
*origanoides (L.) Britt.
Elsholtzia
Stauntonii Benth.
Monarda
*mollis L.
Phlomis
alpina Pall.
Physostegia
*virginiana (L.) Benth.
Prunella
Webbiana Hort. var. major
Salvia
Bulleyana Diels
Sclarea L.
Satureja
Acinos Scheele
*glabella (Michx.) Briquet
vulgaris (L.) Fritsch
Scutellaria
angustifolia Pursh
Stachys
iberica Bieb.
*Clingmanii Small

Solanaceae 256

Nicotiana
alata Link & Otto var. grandiflora Comes
Tabacum L.
Physalis
Alkekengi L.
Schizanthus
pinnatus Ruiz & Pav.
Solanum
*Dulcamara L.

Scrophulariaceae 257

Digitalis
ambigua Murr.
purpurea L.
Gerardia
*maritima Raf.
Linaria
dalmatica Mill.
Pentstemon
glaber Pursh. var. alpinus Gray
hirsutus Willd.
laevigatus Soland. var. Digitalis Gray
Scrophularia
marilandica L.
Verbascum
Blattaria L.
Chaixii Vill.
olympicum Boiss.
songaricum Schrenck
Veronica
Allionii Vill.
incana L.
Teucrium L. var. prostrata Hort.

Orobanchaceae 261

Epifagus
*virginiana (L.) Bart.

Rubiaceae 270

Mitchella
*repens L.

Caprifoliaceae 271

Triosteum
*aurantiacum Bicknell

Dipsacaceae 274

Scabiosa
caucasica Bieb. var. "House's Hybrid"

Campanulaceae 276

Jasione
perennis Lam.

Lobeliaceae 276a

Lobelia
*Gattingeri A. Gray
*inflata L.
syphilitica L.
tenuior R. Br.

Compositae 280

Achillea
nitida Tausch
Anthemis
tinctoria L.
Aster
concolor L.
divaricatus L.
laevis L.
lateriflorus (L.) Britt.
linariifolius L.
macrophyllus L.
novae-angliae L.
novae-angliae L. var. roseus (Desf.) DC.
paniculatus Lam.
Buphthalmum
speciosum Schreb.
Centaurea
dealbata Willd.
Scabiosa L. subsp. Scabiosa (L.) Hayek
Scabiosa L. subsp. spinulosa (Rochel) Hayek

Chrysanthemum
Myconis L.
Parthenium Pers. var. aureum Hort.
Chrysopsis
falcata (Pursh) Ell.
Cirsium
Diacantha DC.
Coreopsis
grandiflora Hogg
palmata Nutt.
pubescens Ell.
Emilia
flammea Cass.
Erechtites
megalocarpa Fernald
Erigeron
pulchellus Michx.
Eupatorium
coelestinum L.
hyssopifolium L.
perfoliatum L.
pubescens Muhl.
purpureum L.
purpureum L. var. maculatum (L.) Darl.
resinosum Torr.
rotundifolium L.
urticaefolium Reich.
Gaillardia
aristata Pursh
pulchella Fouq.
Gymnolomia
multiflora (Nutt.) B. & H.
Helianthus
divaricatus L.
"Primrose Perfection"
Heliopsis
helianthoides (L.) Sweet
Inula
magnifica Lipsky
salicina L.
Prenanthes
serpentaria Pursh
Rudbeckia
laciniata L.
hirta L.
Senecio
Jacobaea L.
suaveolens Ell.
Sericocarpus
linifolius (L.) BSP.
Solidago
nemoralis Ait.
puberula Nutt.
sempervirens L.
speciosa Nutt.
Vernonia
noveboracensis Willd.

Monocotyledones

Gramineae 319

Echinochloa
*Walteri (Pursh) Nash
Elymus
canadensis L.
Deschampsia
caespitosa (L.) Beauv.
Panicum
*virgatum L.

Eriocaulaceae 330

Eriocaulon
*articulatum (Huds.) Morong
*decangulare L.

Liliaceae 338

Allium
Porrum L.
*tricoccum Ait.
Chamaelirium
luteum (L.) Gray
Clintonia
*borealis (Ait.) Raf.
Convallaria
majalis L.
Lilium
philippinense Baker
*superbum L.
Maianthemum
*canadense Desf.

Nothoscordum
*bivalve (L.) Britt.
Oakesia
*sessilifolia (L.) Wats.
Polygonatum
*commutatum (R. & S.) Dietr.
Smilacina
*racemosa (L.) Desf.
Smilax
*herbacea L.
Streptopus
*amplexifolius (L.) DC.
*roseus Michx.
Trillium
*cernuum L.
grandiflorum (Michx.) Salisb.
*undulatum Willd.
Yucca
filamentosa L.

Haemodoraceae 339

Lachnanthes
tinctoria (Walt.) Ell.

Iridaceae 344

Sisyrinchium
angustifolium Mill.

SEEDS OF TREES AND SHRUBS

Cupressaceae 24

Thuja
*occidentalis L.

Myricaceae 57

Myrica
*Gale L.

Rosaceae 126

Physocarpus
*opulifolius Maxim.
Prunus
*nigra Ait.
*serotina Ehrh.
*virginiana L.
Rosa
*blanda Ait.
*palustris Marsh
*serrulata Raf.
Spiraea
*latifolia Borkh.

Aquifoliaceae 157

Ilex
*verticillata Gray
Nemopanthus
*mucronata (L.) Trel.

Celastraceae 158

Celastrus
*scandens L.

Staphyleaceae 161

Staphylea
*trifolia L.

Aceraceae 163

Acer
*spicatum Lam.

Vitaceae 170

Vitis
*vulpina L.

Cornaceae 229

Cornus
*alternifolia L.
*canadensis L.
*paniculata L'Hér.
*racemosa Lam.
*stolonifera Michx.

Pyrolaceae 231

Pyrola
americana Sweet
umbellata (L.) Nutt.

Ericaceae 233

Chamaedaphne
*calyculata Moench
Chiogenes
*hispidula (L.) T. & G.
Kalmia
*angustifolia L.
Ledum
*groenlandicum Oed.
Rhododendron
canadense Torr.
Vaccinium
*canadense Kalm

Caprifoliaceae 271

Linnaea
*borealis L. var. americana (Forbes) Rehder
Sambucus
*racemosa L.
Viburnum
*cassinoides L.
*dentatum L.
Opulus L. var. americanum (Mill.) Ait.

SEEDS OF ORNAMENTAL PLANTS

Suggested for Members of the Brooklyn Botanic Garden

Ageratum
Houstonianum Mill.
Althaea (Hollyhock)
"Countryside"
rosea Cav. var. "Palling Belle"
Ammobium
alatum R. Br. (Winged Everlasting)
Antirrhinum (Snapdragon)
majus L. (Mixed Varieties)
Aquilegia (Columbine)
baicalensis Hort.
chrysantha Gray
chrysantha var. nana Hort.
Asparagus
officinalis L.
Baptisia
australis (L.) R. Br. (False Indigo)
Boltonia
asteroides L'Hér.
Boussingaultia
baselloides HBK. (tubers)
Celosia (Cockscomb)
argentea L. var. cristata
argentea L. var. nana
argentea L. var. plumosa
Centaurea
macrocephala Puschk.
Chelone (Turtle-Head)
glabra L.
Chrysanthemum
Mixed Varieties
Coreopsis
Atkinsoniana Dougl.
Cosmos
diversifolius Otto
Dianthus (Pink)
arenarius L.
barbatus L.
caesius Smith
plumarius L.
zonatus Fenzl.
Dodecatheon
Meadia L. (Shooting Star)
Euphorbia
marginata Pursh (Snow-on-the-Mountain)
Gomphrena (Globe Amaranth)
decumbens Jacq.
globosa L.
Gypsophila (Babysbreath)
perfoliata L.

Helianthus
divaricatus L.
orgyalis DC.
Heliopsis
helianthoides (L.) Sweet
Hibiscus
militaris Cav.
Moscheutos L. Hybrids
Liatris (Button Snakeroot)
scariosa Willd.
spicata (L.) Willd.
Lobelia
cardinalis L. (Cardinal Flower)
Lychnis
Coronaria Desr. (Rose Campion)
Viscaria L. (Clammy Campion)
Lythrum
Salicaria L. (Purple Loosestrife)
Monarda (Beebalm)
punctata L.
Nicotiana
Sanderae Sander var. "Crimson King"
Nymphaea (Water Lily)
August Koch
Bisset
caerulea
capensis var. zanzibariensis
capensis var. zanzibariensis rosea
castaliflora
Cleveland
Col. Lindbergh
dentata var. superba
Emily Grant Hutchings
George Huster
H. C. Haarstick
Independence Pink
Juno
Jupiter
Kewensis
Mrs. E. D. Whittaker
Mrs. G. C. Hitchcock
O'Mara
Panama Pacific
Pink Pearl
Sturtevant
Pentstemon
barbatus Nutt.
diffusus Dougl.
Perilla
frutescens Britt. var. nankinensis Bailey
Polanisia
trachysperma T. & G.
Portulaca
grandiflora Lindl.
Ricinus (Castor Bean)
communis L. (Forms)
Rudbeckia (Coneflower)
speciosa Wend.
Salvia
splendens Ker-Gawl (Scarlet Sage)
Senecio
aureus L. (Golden Groundsel)
Silene (Campion)
Armeria L.
latifolia Britt. & Rendle
Schafta Gmel.
tartarica Pers.
Stokesia
laevis Hill
Tagetes
erecta L. var. "Guinea Gold"
patula L. var. "Fire King"
patula L. var. "Legion of Honor"
Talinum
patens Willd.
Torenia
Fournieri Lindl.
Zinnia
elegans Jacq.
Viola
tricolor (Pansy)

Address requests for seeds before March 1 to

SEED EXCHANGE,
Brooklyn Botanic Garden,
1000 Washington Avenue,
Brooklyn, N. Y.,
U. S. A.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1. Annual member	$ 10
2. Sustaining member	25
3. Life member	500
4. Permanent member	2,500
5. Donor	10,000
6. Patron	25,000
7. Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President
EDWARD C. BLUM

First Vice-President
WALTER H. CRITTENDEN

Second Vice-President
ADRIAN VAN SINDEREN

Third Vice-President
SUMNER FORD

Treasurer
EDWIN P. MAYNARD

Secretary
JOHN H. DENBIGH

Botanic Garden Governing Committee

MISS HILDA LOINES, *Chairman*

PHILIP A. BENSON
EDWARD C. BLUM, *Ex officio*
MRS. WILLIAM H. CARY
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
MRS. LEWIS W. FRANCIS
JOHN W. FROTHINGHAM *
WILLIAM T. HUNTER
EDWIN P. MAYNARD
ALFRED E. MUDGE
WILLIAM A. PUTNAM

Ex Officio Members of the Board

The Following Officials of the City of New York

THE MAYOR
THE COMPTROLLER
THE COMMISSIONER OF PARKS

GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue: then turn right.

* Deceased, November 20, 1935.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 68. Monographic Studies in Eleocharis—III. 13 pages. 1934.

No. 69. Plants of the Astor Expedition, 1930 (Galapagos and Cocos Islands). 61 pages. 1935.

No. 70. Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag oats. 10 pages. 1935.

No. 71. Physiologic specialization of the parasitic fungi. 19 pages. 1935.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXV APRIL, 1936 NO. 2

HERBARIUM OF
THOMAS J. DELENDICK

CONTAINING THE

TWENTY-FIFTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1935

"For the collection and culture of plants, flowers, shrubs, and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects; for affording instruction in the same, and for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation, and instruction of the people."

PUBLISHED QUARTERLY
AT PRINCE AND LEMON STREETS, LANCASTER, PA.
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

Entered as second-class matter in the post-office at Lancaster, Pa., under act of August 24, 1912

BROOKLYN BOTANIC GARDEN

Scientific, Educational, and Administrative Officers

SCIENTIFIC AND EDUCATIONAL

The Staff

C. STUART GAGER, Ph.D., Sc.D., Pd.D., *Director*
MONTAGUE FREE, Certificate, Royal Botanic Gardens, Kew, *Horticulturist*
ARTHUR HARMOUNT GRAVES, Ph.D., *Curator of Public Instruction*
ALFRED GUNDERSEN, Docteur de l'Université (Paris), *Curator of Plants*
[1] WILLIAM E. JORDAN, B.S., *Librarian*
GEORGE M. REED, Ph.D., *Curator of Plant Pathology*
ELLEN EDDY SHAW, B.S., *Curator of Elementary Instruction*
HENRY K. SVENSON, Ph.D., *Curator of the Herbarium*
[2] MARGARET M. DORWARD, A.B., *Assistant Curator of Elementary Instruction*

Other Officers

MARY AVERILL, *Honorary Curator of Japanese Gardening and Floral Art*
HAROLD A. CAPARN, *Consulting Landscape Architect*

RALPH CURTISS BENEDICT, Ph.D., *Resident Investigator (Ferns)*
RALPH H. CHENEY, Sc.D., *Resident Investigator (Economic Plants)*

EMILIE PERPALL CHICHESTER, *Library Assistant*
ELSIE TWEMLOW HAMMOND, M.A., *Instructor*
ELIZABETH MARCY, A.M., *Research Assistant*
FRANCES M. MINER, A.B., *Acting Assistant Curator of Elementary Instruction*
HESTER M. RUSK, A.M., *Instructor*
L. GORDON UTTER, M.S., *Research Assistant*

CHARLES F. DONEY, M.S., *Curatorial Assistant*
WILLIAM H. DURKIN, *Curatorial Assistant*
MARGARET BURDICK PUTZ, *Curatorial Assistant*
MARGERY H. UDELL, *Curatorial Assistant*
HILDA VILKOMERSON, A.B., *Curatorial Assistant*

LOUIS BUHLE, *Photographer*
MAUD H. PURDY, *Artist*

ADMINISTRATIVE

DANIEL C. DOWNS, *Secretary and Accountant*
MAUDE E. VORIS, *Assistant Secretary*
NORMA STOFFEL BANTA, *Office Assistant*

MARIE-LOUISE HUBBARD, A.M., *Secretary to the Director*
GERTRUDE W. MERRILL, A.B., *Membership Secretary*
FRANK STOLL, *Registrar and Custodian*

LAURA M. BREWSTER, *Stenographer*
CONSTANCE PURVES ELSON, B.A., *Stenographer*
EVELYN M. GAILER, *Stenographer*

[1] Beginning March 16, 1936.
[2] On leave of absence, 1935–36.

THE BOTANIC GARDEN AND THE CITY

THE BROOKLYN BOTANIC GARDEN, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (about $300,000) and of other permanent improvements (about $253,000) has been met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms of the annual Tax Budget appropriation.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden, from its beginning, to purchase all books for the library, all specimens for the herbarium, all lantern slides and photographic material, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all purposes, are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual member	$ 10
2.	Sustaining member	25
3.	Life member	500
4.	Permanent member	2,500
5.	Donor	10,000
6.	Patron	25,000
7.	Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities and on presentation of membership card in Brooklyn Botanic Garden.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

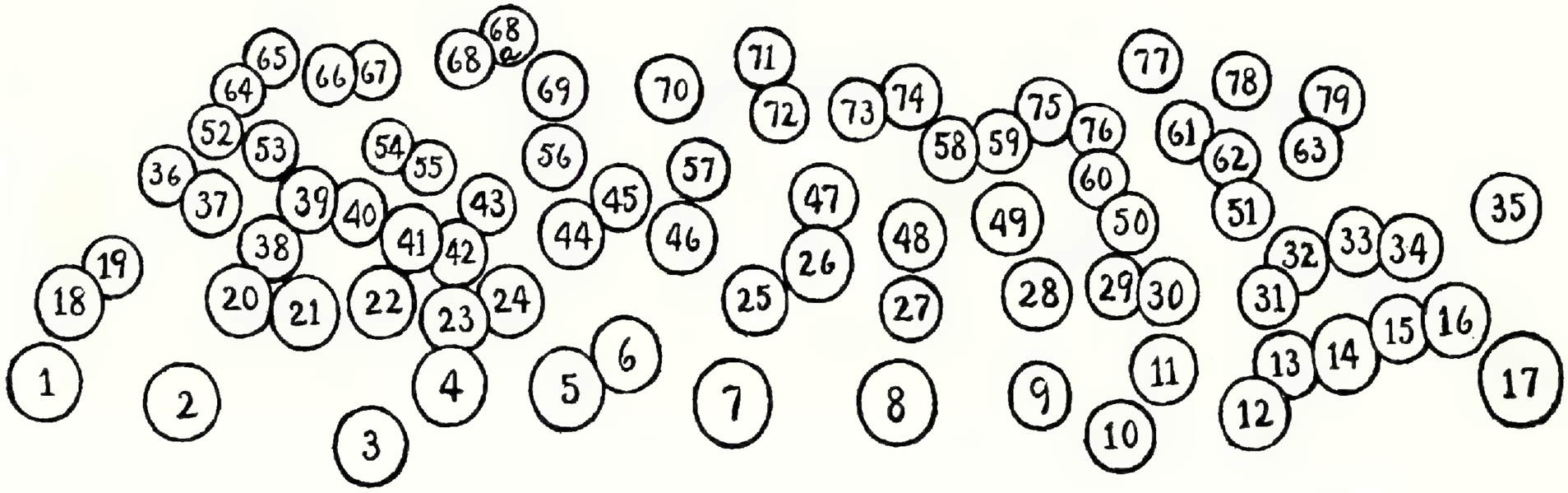
.....

.....

* The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.

FIG. 1. Twenty-Fifth Anniversary Group at Brooklyn Botanic Garden, May 15, 1935.



1. Rodney H. True; 2. ———; 3. ———; 4. Conway W. Price; 5. R. A. Harper; 6. Mrs. R. A. Harper; 7. E. D. Merrill; 8. C. Stuart Gager; 9. Eva Marion Provost; 10. Mrs. C. Stuart Gager; 11. Julia E. Best; 12. Hester M. Rusk; 13. Constance Purves Elson; 14. Bernard O. Dodge; 15. Ellen Eddy Shaw; 16. Edmund W. Sinnott; 17. Ralph C. Benedict; 18. Carl Bannwart; 19. ———; 20. Charles F. Doney; 21. L. Gordon Utter; 22. Maud H. Purdy; 23. Henry F. A. Meier; 24. ———; 25. Mrs. B. O. Dodge; 26. Albert F. Blakeslee; 27. Mrs. Albert F. Blakeslee; 28. Joan Bronstein; 29. Florence L. Barrows; 30. S. Kaiser; 31. A. Dorothy Bergner; 32. Mrs. Amos G. Avery; 33. Sophia Satina; 34. Amos G. Avery; 35. Emilie Perpall Chichester; 36. ———; 37. ———; 38. Elizabeth Marcy; 39. Mrs. Marie E. Conklin; 40. Laetitia M. Snow; 41. S. M. Pady; 42. ———; 43. Mrs. J. H. Beale; 44. G. R. Wieland; 45. ———; 46. Samuel N. Spring; 47. Jacob G. Schramm; 48. John Hendley Barnhart; 49. Hilda Vilkomerson; 50. M. J. Murray; 51. Margaret Hoover; 52. Margaret Burdick Putz; 53. Mary Campbell Bliss; 54. Ruth H. Lindsay; 55. Alice M. Ottley; 56. ———; 57. Sophia H. Eckerson; 58. Charles E. Allen; 59. Mr. John W. Thompson; 60. Evelyn M. Gailer; 61. Margery H. Udell; 62. Marie-Louise Hubbard; 63. Mr. Lebedeff; 64. ———; 65. ———; 66. R. H. Woodworth; 67. F. A. Varrelman; 68. Montague Free; 68a. J. H. Beale; 69. L. O. Kunkel; 70. Orland E. White; 71. ———; 72. A. B. Stout; 73. John C. Wister; 74. Robert Hagelstein; 75. Alfred Gundersen; 76. ———; 77. Arthur Harmount Graves; 78. G. P. Clinton; 79. H. T. Güssow.

HERBARIUM OF
THOMAS J. DELENDICK

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXV APRIL, 1936 NO. 2

TWENTY-FIFTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1935

REPORT OF THE DIRECTOR

TO THE BOTANIC GARDEN GOVERNING COMMITTEE:

I have the honor to present herewith the Twenty-Fifth Annual Report of the Brooklyn Botanic Garden for the calendar year 1935.

INSTITUTIONS THAT ENDURE

Botanic gardens belong to the class of institutions that seem to have an inexhaustible momentum, a secular vitality. A recent writer has noted the fact that colleges and universities are among our oldest surviving social institutions, outliving centuries of political upheaval and economic vicissitude. Oxford University was cited as being older than English parliamentary government. The University of Paris is half a dozen times as old as the French Revolution.

So it is with botanic gardens. Those at Piza and Padua, for example, established about 1545, have continued their work through centuries while political and religious upheavals have wrought the most profound governmental and social changes in the country where they are located. The Jardin des Plantes, at Paris, has persisted while monarchies and republics have come and gone in France. The "Course-of-things," as Sidney Lanier vividly expressed it, "shaped like an Ox . . . comes browsing o'er the hills and vales of Time," devouring one human institution after

another. But colleges, universities, and botanic gardens, though they may wax and wane, tend to persist, because they meet persistent, fundamental human needs.

It is important to keep it always in mind that we are building at the Brooklyn Botanic Garden the kind of an institution that tends to permanency. If we keep this thought before us we may be troubled, but not discouraged, when the Garden, with the rest of the world, is carried by the current of world affairs into a deep trough of financial reverses. We shall also form the habit of always taking the "long view," to which I have referred in a preceding report. The most solid financial and educational foundations are laid, and the most efficient and enduring superstructure is begun, only when the vista of the far-distant future is kept before the mind's eyes.

The First Quarter Century

On May 13–16, 1935, the Brooklyn Botanic Garden celebrated its twenty-fifth anniversary. The "birthday" of the Garden has been arbitrarily chosen as July 1, the date when the first appointment to the Garden's personnel took effect. The first report covered the eighteen months from July 1, 1910 to December 31, 1911. By the end of 1935, the Garden had completed the first six months, only, of its twenty-sixth year. The four days' program of the celebration comprises Appendix 11 of this report (p. 174).

The Garden has every reason to feel gratified at the response of its local constituency and of the botanical world on the occasion of its anniversary celebration. All the meetings were well attended, notes of congratulation and commendation were received from most of the leading botanic gardens of the world, and the publicity accorded the events in the daily papers and scientific and educational press was extensive, and served to make the work of the Garden better understood by a wider circle of friends, nationwide and international.

One of the main purposes of recording last year's achievements in an annual report is to reveal the nature of the undertaking and thereby to inspire confidence, and to arouse in the reader a wish to become an active participant in the work. Such, also, is the

only valid justification for celebrating the progress of an institution from epoch to epoch. Not in a spirit of boastfulness or self-congratulation, not to bask in the plaudits of others, not to emphasize what has been done, but what is being done; to call attention to the undertaking as one of prime importance to the community, and to the progress of civilization, and worthy of generous support; to multiply friends and supporters. If the exercises in celebration of the twenty-fifth anniversary of the Garden have not accomplished these results, they have failed of their purpose. However, we have every assurance to the contrary.

What the City is Doing for the Garden

How the Botanic Garden is supported, and what the relation is between the Garden and the City are two of the questions still frequently asked about the Garden. It may not seem amiss, therefore, at the close of our first quarter century, to make a brief statement in reply to these questions, summarizing the nature and extent of the cooperation between the City and the Garden.

The Municipal Government of New York City has a remarkable and almost unique record to its credit in the cooperation it has extended for more than sixty years to private boards of trustees of its citizens in the establishment and maintenance of its science and art museums, its zoological park, its aquarium, and its two botanic gardens. It is probable that no city in the world has ever been more generous or broad-minded than New York in the support of such institutions, which supplement and enrich the work of its public schools and municipal colleges, promote the general intelligence of its citizens, and make substantial contributions to the advancement of science, art, and culture. And not only within and for the City. The institutions just mentioned are among the largest factors that make the City of Greater New York an educational and cultural center whose influence is felt, not only throughout the State and Nation, but throughout the civilized world.

For the Brooklyn Botanic Garden, as for the other and older institutions, the city provides the site, makes contributions to the cost of the necessary buildings, retains ownership of the plant, and exempts the entire property from taxation.

From time to time appropriations from corporate stock, tax notes, or other sources are made for permanent improvements. Annual appropriations are made in the tax budget for part of the current expenses. During the twenty-five years since the work of the Garden was initiated, on July 1, 1910, the City has appropriated a total of $298,434.29 for initial construction and permanent improvements, such as buildings, grading, walks, fences, et cetera. Its twenty-five annual tax budget appropriations for maintenance, including personal service and other codes, make a total of $1,741,230.64. Thus, the appropriations of the City for Permanent Improvements and for Annual Maintenance amount to a total of $2,039,664.93.

What the Garden is Doing for the City

But the City appropriations alone, including the assignment of the land, would never have made possible the work of the Brooklyn Botanic Garden. Nor was it ever intended that they should. The initial *Agreement,* of December 28, 1909, between the City and the Board of Trustees provided for a cooperative partnership, in which the cost of the enterprise was to be shared by the City and the Board, and the Board was charged with the entire duty and responsibility of administration. The members of the Board contribute their time and services without compensation, and make and secure generous contributions of private funds to supplement those of the City. The total amount of private funds provided by the Board during the Garden's first quarter century is as follows:

Permanent Endowment	$1,088,939.49
Permanent Improvements	233,245.96
Scientific and Educational Work	216,516.93
General Maintenance	79,354.19
Total Private Funds Provided, 1910–1935	$1,618,056.57

In short, by its total contributions of $2,000,000 plus, the City has secured contributions of private funds of more than $1,600,000.00, or over three-quarters as much as the City appropriation. All that the Board of Trustees was required to provide by the terms of its *Agreement* with the City was $50,000.00.

For several years, the Private Funds Budget of the Garden has equalled or exceeded the City appropriations. This is true of some of the other "semi-public" institutions referred to above. It is probable that in no other cases does the City secure two dollars worth of public service for every dollar appropriated. A portion of the initial cost of grading and soil improvement and one-half the cost of completing the Laboratory Building and Conservatories were provided from private funds. The entire cost of constructing the Japanese Garden, the Rose Garden, the Conservatory Plaza with water-lily pools, the four bridges over the brook, and the Richard Young gate was also met from private funds. When the South Addition of several acres was assigned to the Garden by the City, in 1914, the cost of fencing it in ($2,508.93) was met entirely from private funds, contributed by Mr. Alfred T. White. Without this, the tract would have been of no use whatever to the Garden. The City has never been asked to make any appropriation for living plants for the Plantations and Conservatories, for publications for the Library, nor for specimens for the Herbarium. These collections are all accessible to the public without charge every day in the year except Sundays and holidays. The services of staff members, whose salaries are paid wholly or in part from private funds, are available to every citizen, without charge, for consultation and advice on every aspect of plant life and gardening. Part of the cost of guards to direct the public, and safeguard the collections on Sundays, holidays, and other days, is also met from private funds.

From time to time, the director of the Garden has had inquiries from the officials of other cities as to the relation between the Garden and the City. From such statements as those above, it is clear that the City derives a full measure of return for its appropriations, and that the cooperation is in every way of mutual advantage.

World-Wide Service

To mention only the Botanic Garden's services to the City where it is located would be to give an inadequate and misleading impression of its work. While funds available have not made possible an extensive program of botanical exploration, the Garden has

FIG. 2. The Brook and Willows, facing northwest. June 25. (8886)

participated in a botanical expedition to Western Cuba, supplied the botanist of an expedition across South America to explore the Amazon basin (Mulford Expedition), and of the Astor Expedition to the Galapagos Islands. It has sent its own expedition to study the wild and cultivated Iris of Japan, and, as a matter of routine, has been continuously engaged in botanical field work in various parts of the United States. The results of these expeditions have been embodied in published reports and scientific papers.

In the matter of botanical publication the Garden, by cooperation with the Botanical Society of America and the Ecological Society of America, has made possible the foundation of two research journals—the *American Journal of Botany,* monthly, now (1935) in its twenty-first volume, and *Ecology,* quarterly, now in its fifteenth volume. By cooperation with the Editorial Board of the bimonthly journal *Genetics,* the Garden has made possible the continuation of this journal beginning with its sixth volume (for 1921). These three journals circulate in 53, 48, and 37 countries, respectively.

The Brooklyn Botanic Garden RECORD circulates in 59 countries, the *Memoirs* (scientific monographs and papers) in 47, the *Contributions* (reprints of research papers) in 34, and the popular *Leaflets* in 28.

The annual exchange of seeds of native American plants for seeds of the native plants of foreign lands involves 160 botanic gardens located in 40 countries. *The List of Seeds Offered in Exchange* goes to each of these gardens as the January issue of the RECORD. It is doubtful if any Brooklyn institution, scientific, educational, or commercial, is known over a wider geographic range.

As usual, the routine of investigation has involved the exchange of research material and ideas with investigators in many foreign lands. The educational program of the Garden has served as suggestion and incentive to gardens in other countries. Five of the letters of congratulation on the twenty-fifth anniversary, received from five different countries, contained the following statements: "I have always read your annual reports with great interest, and in many cases I have found in them ideas for organizations I endeavored to realize in my country."

"I am sending my deepest gratitude for your extensive scientific activity, and for the large educational work developed in your institution that I had the opportunity to observe during my visit to America in 1927. I have to confess that I have been inspired in many ways by your example in our own activity and organization work."

"The Botanical Institute . . . offers its sincere congratulations upon this important occasion, and begs to express its earnest wishes for a continuation of the activity in botanical investigation and popularization which has won the Garden so eminent a position in the scientific world."

"Is it possible that the Botanic Garden is only twenty-five, and can so much beauty have been realized in so short a time?"

"The development of this institution and the achievements of the staff during this first quarter of a century are a matter of great congratulation and to me of great personal interest. The whole institution appears to me to be soundly based, well planned, has been so fortunate as to acquire a fine staff, and has a devoted and enthusiastic constituency. It has truly exceeded any expectations that might have been formed at the time of its foundation."

The Public's Obligation to Patrons

This rapid survey of what the Brooklyn Botanic Garden is contributing should not close without a word of appreciation to those who conceived the idea of a Botanic Garden in Brooklyn and to all those whose moral and financial support have made its work possible. In his book, "The American Contribution to Civilization," President Eliot, of Harvard, wrote as follows:

"People may be relied on to make themselves comfortable or wealthy, if they can; but they need every possible aid in making themselves good, or learned. The self-interest of no man and no association of men, would lead to the establishment of a university. . . . Institutions of high education never have been self-supporting in any country; and there is no reason whatever to suppose that they ever can be. If they were made self-supporting they would be inaccessible to the poor, and be maintained exclusively for the rich."

It was their unselfish, civic interest in the cultural welfare of

Brooklyn and of a wider public that led the small group of men and women, within and without the membership of our Board of Trustees, to promote the plan and provide the private funds without which there would, in all probability, never have been a botanic garden in Brooklyn. Like the institutions referred to by President Eliot, botanic gardens never have been and never can be self-supporting if they are to serve the entire community. The need of private-funds support is a continuing one and tends to increase as opportunities and demands for public service multiply. It is a pity that the majority of the million and a half annual visitors to the Brooklyn Botanic Garden do not realize their personal obligation to the private citizens who make it possible, and their debt of gratitude for the advantages which they here personally enjoy.

The Plantations

Perhaps the most striking change in the Plantations to be noted by a visitor who has not seen them for four or five years would be their general aspect of greater maturity. Even those of us who see the Garden almost daily have remarked this year (1935) on the fact that the trees and shrubs are noticeably larger. The impression of newness is fading. Our early problem was to make the Garden appear to be adequately planted; our present problem is to find room for new trees and shrubs, and to decide what ones to remove to relieve overcrowding.

Dutch Elm Disease.—In late June one of our rarer trees, a beautiful specimen of the Red Elm (*Ulmus serotina*), was found by the curator of plant pathology to be suffering from some disease. Careful diagnosis left no doubt that the calamity we have been dreading had at last arrived; the infection was *Graphium ulmi,* commonly known as "the Dutch Elm Disease," first discovered in Holland in 1919. The infecting organism is a parasitic fungus, and is carried from tree to tree chiefly by the smaller European elm-bark beetle (*Scolytus multistriatus*). The symptoms of the disease are a yellowing, browning, and wilting of the leaves, and the browning of the young sapwood when twigs are cut with a knife.

The first appearance of this disease in Brooklyn appears to have been on an elm tree on Ocean Parkway near Prospect Avenue, re-

FIG. 3. Vitis and Willows, facing west. June 25. (8883)

ported in the summer of 1933 by Dr. O. N. Liming, of the United States Department of Agriculture, in charge of the disease eradication campaign then under way in Northern New Jersey, where the disease had earlier appeared. Several thousand infected trees have been detected and destroyed in Northern New Jersey, Long Island, and Staten Island.

The major work of eradication lies within an area of 50 miles radius of New York City, including portions of three states and about 447 villages and cities. The work of eradication is being carried on cooperatively by federal, state, county, and municipal officials, CCC men, Works Progress Administration, and others. It has been stated by Dr. R. P. White, of the New Jersey Agricultural Experiment Station, that there are in this area "at least 25,000,000 elms, 50 per cent of which are small seedlings, brush or swamp elms of no value. Half of the remainder are elms standing in woods and fields with timber value only. There are left about 6,000,000 elms over 15 feet high, many of which are magnificent specimens 80 to 100 feet high, which are shade or ornamental trees. The value of these trees to real estate alone is a staggering figure.* All this is within 50 miles of New York City."

There is no known "cure" for the disease. Spraying is ineffective, as it is in the case of the chestnut blight. The only known way to eradicate the disease is to destroy all infected trees—a disturbing and discouraging fact when we reflect on the commercial and aesthetic importance of the American elm in this country. In fact, the American elm appears to be one of the most susceptible of all the species, and all American species of elm are susceptible. The Asiatic Elm (*Ulmus pumila*) and the Chinese Elm (*Ulmus parvifolia*) appear to be highly resistant.

Our infected tree was cut down on June 28. It was located just west of the Hills Boulder Bridge. We have not only lost a beautiful and somewhat unusual tree, but the landscape effect of that part of the Garden has been marred. The tree was cut down by our own men in the presence of Mr. R. A. Emmons and a group of 18 tree scouts from the United States Department of Agricul-

* An ingenious method of estimating the monetary value of a tree in relation to surrounding real estate has been worked out by Dr. E. P. Felt (formerly New York State Entomologist) and is published in *The Shade Tree*, **9**: 2–4. Jan. 1936.

ture, Bureau of Plant Quarantine, who had come to the Garden to inspect the other elms and the adjacent *Zelkovas*—another genus of the Elm Family.

The cost of plant diseases is enormous. Up to the end of 1935, more than $500,000 has been expended by the Federal, State, and Municipal governments for the work of eradication of the Dutch Elm Disease. In addition to this outlay of cash about 400,000 diseased elms in the quarantined area of New York, New Jersey, and Connecticut have been tagged for destruction. The situation serves to emphasize the importance of generous continuing-provision for the study of the nature and control of plant diseases and of disease resistance in plants.

Horticultural Section.—This Section of about three acres is the land between the Brooklyn Museum site, on the east, and Mt. Prospect Reservoir, on the west. Ever since it was acquired for the Garden, in 1912, we have referred to it as the "North Addition." Because its treatment will be primarily from the horticultural and landscape point of view, it has been, somewhat arbitrarily, christened the "Horticultural Section."

As noted in previous reports, the final work of grading and topsoiling, the construction of the ten pergolas, "crazy" paving, reconstruction of the marginal walks, and other work was begun in January, 1934, and completed during 1935.

The granite for the flight of 23 stone steps leading up from The Lilac Triangle at the South End was obtained from the Brooklyn Museum steps which were removed when the new design for the north facade to the Museum building was carried out. From the same source was obtained the granite blocks for the flight of 30 stone steps leading up from the Rose Garden to the Overlook on the Museum Bank. This flight of steps is a great convenience for the public.

The foundational planting of this Section was done during the spring of 1935 under the personal supervision of our landscape architect, Mr. Caparn. For much of this planting material (small trees and shrubs) we are indebted to the Department of Parks. The planting was done by our own gardeners, but the rest of the labor on this Section was done by men assigned by CWA (Civil Works Administration)—succeeded by WPA (Works Progress Administration)—under Mr. Caparn's supervision.

FIG. 4. Horticultural Section. Stone steps at south end. October 9. Planted in 1935. (8888)

The central feature of the Horticultural Section is a grass panel —the "Long Green"—60 feet wide and more than 400 feet long from north to south. Two curved stone seats and two double columns, with a water basin and fountain between, are planned for each end of this green. At intervals of about 80 feet, ten pergolas (five on each side) have been erected and planted with wisteria and other climbers. Bordering the Long Green on each side are plantings of perennial herbs in a 12-foot strip, with a background of trees and shrubs. Grass aisles pass between and underneath the pergolas on each side, and the entire planted and grass area is bordered by paved walks to carry the larger part of the traffic. The first seeding of the lawn on the Horticultural Section was on September 10.

The Wall Garden.—In the preceding report mention was made of the Wall Garden along the Reservoir Embankment. The initial planting of this "Garden" is recorded in the appended report of the Horticulturist, who planned it. The unusual prolongation of warm weather, until the first half of November, gave a long growing season, and the Wall Garden perennials were very well established before winter.

Constructional Work.—Two walks along the upper slope of the Reservoir bank, with flights of stone steps at each end, were constructed several years ago. These have been relaid with WPA labor. They afford an advantageous place for viewing the landscaping below, and, as soon as funds become available, seats should be constructed along the uppermost walk. This affords an admirable opportunity for gifts.

Medicinal Plant Garden.—A garden of medicinal plants has for centuries been a feature of botanic gardens. Some of the earlier botanic gardens, such, for example, as that at Chelsea, England, were chiefly gardens of "simples." In fact, the science of botany in certain of its aspects, as is well known, developed from the study of plants as sources of medicine, and only gradually became a discipline separate from *materia medica* and pharmacy. Many plants are still in use as medicine or as sources of medicine. The very word "drug" means dried plant. A medicinal plant garden, therefore, has historical reasons for inclusion as a part of a botanic garden, and we are assured by physicians in active prac-

tice that such a garden has by no means become outmoded and would be a valuable addition to the Brooklyn Botanic Garden. A Medicinal Plant Garden has been a part of our plans from the beginning, and a start was made toward planting it in the early years. For a number of reasons, those early plans could not be carried through to completion.

In the spring of 1935, it was decided to utilize some of the WPA labor that became available to prepare an area north of the Japanese Garden for development as a garden of medicinal plants and culinary "herbs." Plans prepared by our landscape architect, Mr. Caparn, have progressed throughout the year, and may be carried to completion in the spring of 1936.

The Japanese Garden.—Through lack of funds it was possible to command the services of the Japanese gardener, under Miss Averill's direction, for only two weeks in 1935, and the work has had to be confined to the most urgent items of routine maintenance.

Anthophyllite Boulder.—During 1934 the surface of the vacant lot on the east side of Washington Avenue, between Carroll and President Streets, was brought down to the approximate level of the sidewalks by removing the morainal deposit of sand, gravel, and boulders, which formed an uneven surface rising in places as much as ten feet above the street level. One of the large boulders, measuring 6 ft. high by 8 ft. 8 in. wide, had such an interesting surface that we brought it into the Garden (with WPA labor) and placed it on the south side of the walk just inside the north Washington Avenue gate. In the spring of 1935, Prof. Robert Balk, of Hunter College, determined that the boulder was a mass of anthophyllite, a variety of the mineral hornblende (amphibole group). The name refers to the character of the crystals, which form radiating groups, resembling the flowers of the Compositae. These masses commonly form around masses of serpentine or similar rocks rich in magnesia, due to the action of hot solution, following the intrusion of serpentine magmas.

This boulder, like all the others in the Botanic Garden, was transported to this region by the continental glacier during the Ice Age. According to information supplied by Dr. D. H. Newland, New York State Geologist, "The boulder may have come from around New Rochelle or Port Chester where the mineral anthophyllite is known to occur, or it may have come from farther

away, in Connecticut or even Massachusetts. It is quite certain that it did not come from the Highlands region nor from the Adirondacks. . . . The rocks in the Highlands and the Adirondacks of course are largely Precambrian granite and gneisses in which it would hardly be expected that anthophyllite would occur. . . . It seems to me the greater probability that it has come from somewhere to the north of Long Island Sound."

On the question of the probable origin and mode of transportation of the boulder, Dr. Ernst Antevs, one of the leading authorities on the phenomena of the Ice Age has kindly commented as follows:

"Preserved glacial striae record late, or the last, direction of ice flow. Crossing striae indicate that the direction of flow could change considerably. Therefore an erratic boulder can have been transported by two or more consecutive zigzag flows of the same ice sheet. It can have been carried by two or more ice sheets, or part of the way by a floating ice berg.

"Therefore, the anthophyllite boulder can have been transported from New Rochelle-Port Chester region southwestward by an ice sheet older than the last, or by an early flow of the last ice sheet. It can then have been carried southeastward by the last flow of the last ice sheet to the Brooklyn Botanic Garden. Or the boulder can have been carried by an ice sheet southward or southeastward from its ledge. It can then have drifted southwestward in Long Island Sound with a detached floating ice berg, and finally have been picked up by the last southeastward flow of the last ice sheet and brought to Brooklyn. If the bedrock-geologists insist that the boulder cannot derive from the region on the Hudson or west of the Hudson, its transportation from the northeast consequently can be explained."

In order to balance the treatment of the entrance a second boulder (of undetermined composition) was brought from the same lot across Washington Avenue and placed on the north side of the walk, opposite the first one.

Late Fall Bloom.—Unseasonable warm weather, continuing until as late as December, caused a number of normally spring-blooming plants to come into flower in late fall. A shrub of the flowering quince (*Chaenomeles Maulei*), in Section I, was photographed in full bloom on November 18.

Further details concerning the Plantations may be found in the Report of the Horticulturist, on pages 115–123.

Research

The two hundredth anniversary of the founding of the Royal Society of London was celebrated in 1866. This Society, as is well known, was founded for the stated purpose of "improving natural knowledge." The Plague broke out in 1864, two years before the Society was founded, and the Great Fire of London occurred in the autumn of 1866. It was between these two calamities that the Royal Society was founded. In his bicentennial address "On the advisableness of improving natural knowledge," Professor Huxley stated that, "to him who had the gift of distinguishing between prominent events and important events, the origin of a combined effort on the part of mankind to improve natural knowledge might have loomed larger than the Plague and have outshone the flare of the Fire."

The scientific events of Huxley's time gave an impetus to human thought and to the recognition of the value of natural science, which is still felt. The importance to mankind of a *continuing program* of scientific research is now universally recognized.

Botanical research has always been a major activity of those botanic gardens which have been independent institutions. The history of the earliest gardens, in Italy, is almost exclusively a history of investigations carried on there for the purpose of extending our knowledge of plant life. The duties of Linnaeus as Director of the Botanic Garden at Upsala were almost wholly confined to research, the educational and curatorial work being assigned to a Demonstrator appointed specially for that work. Brief summaries of the results of research carried on at the Garden during 1935 are given on pages 45–78.

Public Education

"When a man's busy why leisure
Seems to him wonderful pleasure;
Faith, when at leisure once is he,
Straightway he wants to be busy."

So sang the poet Browning; so indeed it is. But busy with what? If leisure and fatigue go together, as is apt to be the case

with only a modicum of leisure, one wishes chiefly to rest. It is ample leisure, with a margin beyond what is required for rest and recreation, that makes one "want to be busy." "God forbid that I should ever be at leisure," said Dionysius the Elder, living in classic Greece, where the system of slavery gave abundant leisure.

Health and plenty and ample leisure are three gifts of applied science to man. He does not always avail himself of all three. Through ignorance or prejudice he may miss health; through political and economic stupidity and greed the masses may miss plenty. But, like greatness to some, leisure seems now to be thrust upon nearly all of us, *nolens, volens*. What shall we do with it? "Adult education" is the prompt answer of the educator. This, of course, implies a belief that the average adult is not only capable of being educated, but wishes to be. In fact, it implies that he is more or less eager to be, for it is of the essence of worthwhile "adult education" that it is voluntary and spontaneous. In fact, the complete picture of the realized program portrays the mass of the people like *hoi polloi* in classic Greece eagerly frequenting the lecture room, the museum, the botanic garden, the library. The amount of positive effort put forth will depend in part on how inspiring and stimulating the lectures and labeled exhibits are.

In science education another factor is involved. Science is founded on observation (although it does not stop there), and a program of adult (as well as childhood and adolescent) education in science necessitates provision for each student to get the data of science, in part at least, by first hand observation of natural phenomena in field and laboratory. Here is where the plantations of a botanic garden function; they are, in essence, an assembly in small compass of a rich assortment of facts of plant life. In the plantations and conservatories one has the advantage of a range of phenomena that otherwise could be seen and studied only by extensive travel. The study of this material (with or without the guidance of a teacher) lays the necessary foundation for profitable reading and discussion, supplemented and enriched by lectures.

Elementary Education

The work of the Department of Elementary Education, including teachers in the Public Schools and children from approximately 10 to 18 years of age, has continued along much the same lines as heretofore. This work grows in importance and in public appreciation, and has become known over a wide geographic range. The sustained interest and attendance of boys and girls over periods of from three to seven years is one of the most encouraging features of the work and greatly enhances its educational value.

More than 1,000,000 penny packets of vegetable and flower seeds were supplied in 1935 to school children for planting in school and home gardens. The number of plants raised in classes, as a by-product of learning how to raise plants, has exceeded 30,000. Such figures of quantitative results should not divert attention from the much more important educational results of the courses of instruction—results which, of course, cannot be expressed in figures.

The Library

"It is awful to think how much there is to read." So wrote Charles Darwin to Sir Joseph Hooker, the Director of Kew, in 1845. It is difficult to imagine what adjective would have expressed Darwin's state of mind were he to have written in 1935. In building up the library of the Brooklyn Botanic Garden from 75 books at the end of 1911 to 18,770 books and 15,378 bound pamphlets at the end of 1935, it has been our aim to acquire the important incunabula, herbals, and botanical classics, complete files of the most important periodicals, and the important works of reference. Special endeavor has been made to strengthen the library along the lines of the educational and research work in progress at the Garden, and the development of the plantations.

The Library is woefully underfinanced. Only 113 volumes were added by purchase in 1935—about half as many as in 1934. Books received by gift, exchange, and binding bring the total to 245 volumes. The average number of volumes added annually from 1911 to 1934 exceeds 800. The current receipt of nearly 1,000 periodical publications means 1,000 volumes to be bound each

year, in addition to other binding. The need for a permanent endowment fund for the Library becomes more urgent each year.

The use of the Library by the general public and by scientific workers continues to increase annually. It is hoped that the position of Librarian, vacant since 1932, may be filled early in 1936.

Herbarium

In his appended report the Curator of the Herbarium stresses the need of more table space for visiting botanists, and the addition to the staff of a trained herbarium assistant. The increasing use of the herbarium is reflected by the fact that in 1935 more than 3,500 sheets were borrowed for study, as against 731 in 1934; and more than 1,100 sheets were loaned to other institutions, as against only 40 sheets in 1934.

In 1935 more than 8,900 specimens were accessioned in the phanerogamic herbarium as against 4,582 in 1934; and 1,722 specimens were distributed in exchange with other herbaria, as against 420 in 1934. A total of 190 specimens were added to the fungus herbarium, including 98 specimens of Powdery Mildews from China. Among these are several type specimens of new genera and species as recorded by the Chinese botanists.

Cooperation

United States Botanic Garden.—The Director of the Brooklyn Botanic Garden continued to serve, with nineteen other citizens, on the "Planning Commission in connection with the United States Botanic Garden, and for other purposes," appointed at the second session of the 73d Congress, in 1934. He also continued to serve as a member of the Subcommittee on Scope and Function (Mr. B. Y. Morrison, Chairman), and as Chairman of the Subcommittee on Education and Public Relations of the Planning Commission. The other members of this Subcommittee were: Prof. Oakes Ames, Harvard University; Mrs. Fairfax Harrison, Belvoir, Fauquier County, Virginia; Dr. Leicester B. Holland, Chief, Division of Fine Arts, Library of Congress; Dr. William R. Maxon, U. S. National Museum; Dr. George T. Moore, Director, Missouri Botanical Garden; Mr. B. Y. Morrison, Principal

Horticulturist in Charge, Division for Plant Introduction, Bureau of Plant Industry, U. S. Department of Agriculture; and Mr. Robert Pyle, Chairman, Botanic Gardens and Arboretums Committee, National Association of Nurserymen.

The Report of the Subcommittee on Education and Public Relations was submitted on September 18, 1935 to Hon. Frederic A. Delano, Chairman of the Planning Commission.

City of New York

Broadcasting.—The Garden has continued, now for the third consecutive year, its cooperation with the Municipal Broadcasting Station WNYC, 14 talks having been broadcast on the work of the Botanic Garden and on general botanical and horticultural topics.

Department of Parks.—Cooperation with the Department of Parks in the matter of WPA labor is reported on page 35. Further cooperation is recorded in the report of the horticulturist, on page 119. The Department also generously supplied trucks and drivers to bring to the Garden from Staten Island four loads of broken serpentine rock from the quarry of Mr. Ernest Flagg, Staten Island, for the Local Flora Section. For these gifts and services letters of thanks from the Botanic Garden Governing Committee have been sent to the Park Commissioner, Mr. Robert Moses.

Sewer Line for the Zoo.—During 1934 the Park Department, as a PWA project, began the construction of a Zoo in Prospect Park on the site of the old duck pond just across Flatbush Avenue from the Garden and nearly opposite our service gate. When application was made for a sewer connection from the Zoo to the trunk line on Flatbush Avenue, it was learned that that line had for some time been over-loaded and no more permits for connection could be granted. The only alternative was to carry the Zoo line across the Botanic Garden and connect with the trunk on Washington Avenue. After conference with the Park Department, permission was given for this, a line being found which, for most of its length, followed the thirty-foot grass aisle between the Polemoniales on the north and the Gentianales on the south, crossing the tulip border and the Experimental Garden on the east.

Work began January 22, 1935, and we were assured it would be completed in less than one week. It began snowing the day the excavating began and continued to snow for two days. The back filling with the excavated soil was not completed until about the middle of April. About 100 imported tulips were destroyed, and the lawn had to be entirely remade in the fall by our own men.

Report on PWA labor supplied through the Department of Parks will be found on page 35.

Department of Education.—In addition to the routine annual cooperation in the matter of school classes at the Garden, the supply by gift and loan of plant material for study, of penny packets of seeds for school gardens, and the giving of talks at schools has been continued. The demands for this cooperation increase each year. Some 22 talks and addresses were given at public and high schools during the year. A large proportion of the salaries and other cost of this service is provided from private funds.

New Jersey College of Agriculture.—Under the Extension Service of this College, Mr. Free and Miss Shaw have, for the fourth year, continued their talks on aspects of gardening over station WOR to the Radio Garden Club and others. Twelve talks have been given, one each month—ten by Mr. Free and two by Miss Shaw. Members of the Radio Garden Club are now enrolled from twenty states, the District of Columbia and Canada. Other institutions cooperating are the New York Botanical Garden and the Federated Garden Clubs of New York, New Jersey, and Bergen County, New Jersey. As a result of this cooperation newspaper items, with a view of our Rock Garden, have appeared in papers as far distant as Helena, Montana. In his broadcast of May 13, over WOR, the opening day of our Anniversary Celebration, Mr. C. H. Connors, of the New Jersey College, called special attention to the exercises of our Anniversary week.

International Flower Show.—At the 1935 show, March 18–23, the Garden installed an exhibit, occupying 500 square feet, on Garden Operations. This exhibit, planned by Mr. Free and installed under his supervision, was awarded a silver medal. The Garden has received clippings of more than 30 news items about the exhibit in the daily papers and horticultural journals. The

Gardener's Chronicle of America for April contained a special commendatory article on the exhibit.

The Director of the Garden served on the Special Committee on Awards, and also on the Committee of the Garden Club of America for the award of the Club's gold medal for the outstanding exhibit of the Show.

The Garden is specially indebted to Mr. William T. Hunter, Acting Chairman of the Botanic Garden Governing Committee during the winter absence of Miss Loines in Florida, for the services of a truck and driver from his firm, A. Schrader's Son, Inc., for transporting our exhibit to and from the Show. This indispensable service has been rendered annually by Mr. Hunter for a number of years.

Horticultural Society of New York.—Dr. Svenson reports the conclusion, on February 11, of his course of instruction on Plant Identification, which began at the rooms of the Society, and for its members, in the fall of 1934. The Director of the Garden continued, for the eighth year, on the Board of Directors of the Society.

Department of Botany, Brooklyn Institute of Arts and Sciences.—For the second season this department, a subdivision of the Department of Education of the Institute, held its regular meetings, six in all, at the Garden. Dr. Graves, of the Garden staff, was the speaker on the evening of October 9.

School Garden Association.—The sixth annual meeting of delegates ("nature curators") from the forty-one public schools and one high school having school gardens conducted by this Association during the summer in Brooklyn was held at the Botanic Garden on November 26. Mr. Van Evrie Kilpatrick is the Executive Vice-President of the Association and President of the New York Chapter of the American Nature Study Society. On February 1, 1936, Mr. Kilpatrick will retire as Director of nature-garden work of the schools of Greater New York. In view of this fact, the meeting at the Garden was made a special testimonial to his work. A child delegate from each school extended a greeting from his or her school to Mr. Kilpatrick, and the Director of the Botanic Garden presented him with a gold medal, similar to the medals awarded to the children of our own children's garden.

Chronica Botanica.—Volume 1, Number 1, of this publication appeared in April, 1935. The Director has been a member of the Advisory Board since 1934. This first issue contains an article about the Brooklyn Botanic Garden and reproduces a chart showing our work in cooperation with other institutions.

Botanical Society of America.—For twenty-two years the Garden has cooperated with the Botanical Society of America in the publication of the monthly research journal, *American Journal of Botany.* It was the cooperation of the Garden and the responsibilities it assumed in 1914 that made possible the establishment of the Journal in that year. Since the support of the Garden seemed no longer essential to the continuation of the Journal, the Garden suggested the termination of the cooperation. The letters exchanged in this connection, and the final report on the business management of the Journal for the twenty-two year period are given in Appendices 9 and 10, pages 167 and 169.

Miscellaneous.—Cooperation with the following institutions is mentioned elsewhere in this report: Kings County, Prospect Heights, and St. John's hospitals by giving courses to their nurses' training classes; Brooklyn Bureau of Charities by giving employment to 18 men registered with them; The State Institue of Applied Agriculture on Long Island, at Farmingdale, in connection with the Iris project; the Ecological Society of America, the Editorial Board of *Genetics,* and the Botanical Society of America in the publication of research journals.

Cooperation with Governmental Relief Agencies

When work relief began, some four years ago, the original administration was *The Mayor's Official Committee for the Relief of the Unemployed and Needy,* popularly known as "the Gibson Committee," from the name of its Chairman. This was replaced three years ago by the *Emergency Unemployment Relief Committee,* the distributing agency for which was the *Emergency Work and Relief Bureau* (EWB and ERB), supported by the City of New York through its Department of Public Welfare. The EWB was also referred to as TERA (*Temporary Emergency Relief Administration*).

Two years ago the Federal Government began making loans to agencies known as CWA and CWS (*Civil Works Administration and Civil Works Service*), both local organizations functioning as New York State agencies.

Beginning August 1, 1935, the Federal Government established what is known as the WPA (*Works Progress Administration*), which has functioned continuously since that date, and for which budgets are established up to June 30, 1936. These budgets are supplied entirely by the Federal Government and are administered as a Federal agency.

The Botanic Garden has, from time to time, been in cooperation with all of these agencies, as reported in preceding Annual Reports. During 1935, the cooperation has been as follows:

Temporary Emergency Relief Administration (TERA) and Works Progress Administration

Horticultural Section.—The ten pergolas (five on each side) of stone uprights and wooden beams for vines were completed during the fore part of May; also most of the foundation planting of trees and shrubs was done under the supervision of Mr. Caparn. The planting of the Wall Garden and the seeding of the "Long Green" and the rest of the lawn areas were done by our own men.

Actinidia Pergola.—The Actinidia or "Silver Leaf," strong-growing vines, had never had any support prior to 1935. Mr. Caparn designed for them a substantial pergola of reinforced concrete with wooden beams, extending along the east walk on the edge of the Violales area.

Medicinal Plant Garden.—Mr. Caparn, in his capacity as landscape architect for the WPA and its predecessors, made designs for the development of a Medicinal Plant Garden on the area north of the Japanese Garden. These plans were approved and the work was progressing toward completion at the end of the year when winter weather put a stop to outdoor work.

Local Flora.—Under the same agency and oversight, considerable work has been done during the Fall in providing special cultural conditions in the Local Flora Section.

The arrangements for all the above projects were made through the office of the Department of Parks and we are under obligations

FIG. 5. Actinidia Pergola, completed May, 1935, with WPA labor. (8890)

to Commissioner Robert Moses, Mr. R. C. Jenkins, Borough Director for Brooklyn, and others of the Park Department personnel for helpful and generous cooperation in our projects.

Emergency Relief Bureau: Works Division

Service Department.—Project No. 89–Fb–374–X is for the purpose of enabling the Garden "to supplement its regular staff with additional staff so as to more effectively serve the public and to take care of accumulating but urgently needed work which could not otherwise be done." The project was rewritten, dating from February 15. As the official report of July 3 says: "In no case have any of the men and women assigned to the Botanic Garden been engaged in what is sometimes referred to as 'made work'; in every instance they have been occupied in work which would be done by regular employees if the Garden had funds sufficient to make the appointment of regular employees possible." The work has consisted of general office assistance, laboratory and curatorial assistance, translation of scientific publications from various foreign languages into English, and guard duty in the building and on the grounds. These activities, of course, are of a continuing and recurring nature, and so no question arises of a date when the "project" will be completed.

The Botanic Garden has met all the expenses in providing the necessary additional office supplies and equipment required for these workers, including considerable additional general overhead. Members of the regular personnel have also cooperated in laying out and supervising the work, and in giving the necessary instruction in the numerous cases where the technical nature of the work made such instruction necessary.

The minimum number, as of January 31, was 20 (7 men, 13 women). As of May 31, there were 27 (12 men, 15 women).

"The cooperation between the Works Division and the Garden has, in general, been quite satisfactory. A factor essential to this, in addition to the attitude of cooperation on both sides, has been the approval by the Bureau of our requirement that the Botanic Garden should not be expected to retain men or women assigned to it who were found to be incompetent, non-cooperative, or dis-

turbing to the fine morale of our regular personnel." The quotation is from the report of the Director of the Garden to the Works Division for the period February 16 to July 31, 1935.

The amount assigned for personnel for the above project for the period February 16–July 31, 1935 was $19,656.00.

United States Works Progress Administration for the City of New York

On August 1, 1935 the Works Division Service Department project began operating under the WPA, as Project No. 65–97–311, Service Job 1374. The project began in February, 1934, under Civil Works Administration (CWA) of Emergency Relief Administration (ERA). As of December 31, 1935, there were 36 persons assigned to the project. On the basis of estimated personnel service of 58 (696 man-months), the WPA approved a total of $55,332, but, of course, this was not all required by the reduced personnel.

Street and Play Centers.—On June 21 we received a letter from Project Supervisor John J. Keefe, of the Lower West Side Unit, street and play centers, of the Works Division of the Emergency Relief Bureau. One of the aims of this agency is to provide recreation for the children of New York on play streets in localities where recreational and park facilities are few. The letter said: "We have secured a plot of ground belonging to a church and have obtained permission to landscape this lot, and have formed a garden club composed of boys and girls up to the age of sixteen who will carry on this work."

Having no funds allotted for plants, seeds, bulbs, or fertilizer, the Supervisor inquired whether the Brooklyn Botanic Garden had surplus of any of these materials which it could supply.

This activity is, of course, directly in line with our educational work with boys and girls, and we were very glad to supply the following material which was called for on June 27: 25 barberry, 300 English Ivy, 500 gladiolus, 100 zinnia, 100 dwarf marigold, 25 *Impatiens Holstii*, 50 *Verbena venosa*, 50 petunia, 10 salvia, and 10 chrysanthemums.

Woman's Auxiliary

In connection with the exercises of the Twenty-fifth Anniversary week, the Woman's Auxiliary, under the chairmanship of Mrs. Charles E. Perkins, rendered invaluable service, taking entire charge of the social arrangements throughout the week, including the reception on Monday evening, the Annual Spring Inspection on Tuesday afternoon, and the buffet luncheons on Wednesday and Thursday. Members of the Junior League of Brooklyn also assisted at these functions. The Auxiliary contributed more than $300 toward the expenses of the Anniversary. Mrs. Edwin H. Thatcher was chairman of the Social Committee.

A flower arrangement course of five sessions was offered for the third year under the auspices of the Auxiliary, beginning January 8. One hundred and forty-three members of the Garden and others registered for the course.

Membership

During the year 76 new members were enrolled, and the total number of members of all classes, as of the date of publication of this report (April, 1936) is 1,031. This small enrollment in a borough of two and one-half millions of population reflects the stringency of the times and the unusually urgent demands on everyone to contribute to relief.

On April 26–30 occurred our annual distribution of surplus plants to members of the Garden. Nearly 8200 plants of Iris, Chrysanthemum, Rock Garden plants, and other herbaceous plants were distributed to 273 members who came for them. This service has been a positive factor in encouraging members to have gardens of their own, and has thus been indirectly a stimulus to the florists' trade.

Personnel

Mr. John Whipple Frothingham, a life member since May, 1915, a trustee since March 9, 1916, and a member of the Botanic Garden Governing Committee since 1920, died in Guethary, France, on November 20, 1935. Mr. Frothingham was 57 years of age and a native of Brooklyn. He was a nephew of Mr. Alfred T. White, the "father" of the Botanic Garden. Shortly after the

decease of his uncle a proposal was made to discontinue our project of research in plant pathology, toward which Mr. White had contributed $50,000 and to expend the unincumbered balance of the fund for general purposes. The termination of this project would have been a serious blow to the Garden. Mr. Frothingham saw this clearly and secured statements in commendation of the work and of its importance from the National Research Council and other sources. This resulted in saving the unincumbered balance for the purpose intended by the donor, and in securing annual contributions of funds which have insured the continuation of the work. Suitable resolutions on Mr. Frothingham's death were adopted by the Board of Trustees on January 16, 1936, and by the Governing Committee on February 17, 1936, the first meetings after his death.

Mr. Philip A. Benson, President of the Dime Savings Bank, Brooklyn, became a life member of the Garden on June 1, 1935. On June 13 he was elected a member of the Board of Trustees and appointed to the Botanic Garden Governing Committee.

Mrs. Charles E. Perkins, Chairman of the Woman's Auxiliary since November, 1932, resigned as of November 22, 1935. Her resignation was accepted with sincere regret. The substantial services rendered the Garden by the Auxiliary under her Chairmanship have been recorded in this and preceding Reports.

Mrs. Irving L. Cabot was elected Chairman of the Woman's Auxiliary in place of Mrs. Perkins, resigned, her term of office beginning as of November 22. Mrs. Cabot was Chairman of the Luncheon Committee during Anniversary week last May.

Mr. Walter V. Cranford, though not an official member of the Botanic Garden nor of the Brooklyn Institute, was one of our Donors, in consideration of the gift of $15,000 by himself and his wife, which made possible our Rose Garden. His death on December 5 removed one whose generous interest was sustained and active for many years. His gift was not alone to the Botanic Garden but to the entire community and to horticulture in the widest sense. Mr. Cranford's firm built the original subway through Fulton Street and lower Flatbush Avenue to the Long Island R. R. Station, also a section of the Brooklyn subway loop under Center Street, Manhattan, and later the six track combined

Interborough and B. M. T. subway under Flatbush Avenue from Prospect Park Station to the Long Island R. R. Station.

Hon. Richard Young, like Mr. Cranford, was not officially connected with the Botanic Garden, but during his term as Commissioner of Parks for the Boroughs of Brooklyn and Queens in 1902 and 1903 (then under one commissioner), he was instrumental, with others, in saving the present site of the Garden from being covered with buildings. At the Spring Inspection of 1929 Mr. Young formally presented to our trustees the beautiful and greatly needed gate at our south Flatbush Avenue entrance. For this gate Mr. Young made the generous contribution of $17,000. This gate is not only an addition to the architectural beauties of the City, but it is difficult to see just how, without the gate, we could have handled the crowds that enter there, amounting on some week-ends to more than 10,000 in one day. The passing of Mr. Young was the loss of a valued friend as well as of one of the outstanding citizens of Brooklyn. He was often referred to in print as "the grand old man of Flatbush," for he had been associated for years with the local board of education and every movement for civic betterment. In consideration of this gift Mr. Young was elected by the Trustees to the class of Donors.

Margaret M. Dorward, Instructor, March 17–July 15, 1930; Acting Assistant Curator of Elementary Instruction, July 16, 1930–December 31, 1932; and Assistant Curator since January 1, 1933, was granted leave of absence, beginning October 1, 1935, for the purpose of a year's study of horticulture in the Swanley Horticultural College, Kent, England.

Miss Frances M. Miner, Instructor in the Department of Elementary Instruction since September 1, 1930, has taken over Miss Dorward's work as Acting Assistant Curator of Elementary Instruction for the period of Miss Dorward's absence.

Miss Beatrice Clark, A.B., Wellesley College, 1935, was appointed instructor from October 14, 1935 to June, 1936.

Gifts

Endowment of Trees.—The planting of trees in the Garden has now proceeded to a point where practically all the sites suitable for memorial trees are occupied. This, however, affords an advantage

to donors of trees for they may now choose a larger tree than might be possible for planting and one that has become established where it is. The Garden has, therefore, adopted the plan of suggesting to donors the endowment of a tree already in place. This, of course, does not make it possible for the one giving a tree to plant it, but the drawback is, perhaps, outweighed by the advantages of the endowment plan. The minimum amount required for the endowment of a tree is Fifty Dollars. Three of the "Victory Maples" on the Esplanade have been endowed by chapters of the N. S. D. A. R.

On May 14 exercises were held on the Sapindales area in connection with the endowment of a Horsechestnut (*Aesculus Hippocastanum*) presented by the Brooklyn Civic Council in honor of the civic services to Brooklyn of former Borough President, Lewis H. Pounds, who was also founder of the Civic Council and has been its Chairman since its beginning in 1923. While he was Commissioner of Parks for Brooklyn, Mr. Pounds rendered valuable services in behalf of the Brooklyn Botanic Garden. A delegation of officers and members of the Council was in attendance.

On June 13 exercises were held, also on the Sapindales area, in connection with an endowment of a double-flowered Horsechestnut (*Ae. Hippocastanum* var. *Baumanii*) given by the Girls Commercial High School, our neighbor across the street, in commemoration of our own Twenty-Fifth Anniversary—a very gracious thought. The Principal of the school, Mrs. Evelyn W. Allan, and a large delegation of faculty and students attended.

A list of the year's gifts is given on pages 141–149. All gifts have been acknowledged with the thanks of the Botanic Garden Governing Committee.

Financial

One should, perhaps, always be economical, but there is a point beyond which further economy can operate only to disadvantage. The Botanic Garden has been at that point for some time, and has suffered in various ways from excessive forced economy. We have, however, always lived within our income. The Botanic Garden has never closed a year with a deficit.

Endowment Increment Fund

One of the most regrettable results of reduced income was the necessity during 1935 of expending the larger part of the interest income of the Endowment Increment Account, by special authorization of the Governing Committee. Normally, this income is added to the principal each year and invested. The exceptional expenses of the Twenty-Fifth Anniversary celebration were largely met from this fund. We can only hope it may not be necessary to draw on this income again. By the Endowment Increment plan, inaugurated in January, 1921, $130,380.94 have been added to the permanent endowment fund of the Garden up to December 31, 1935.

Collections Fund

The amounts contributed to this fund, annually solicited, have been as follows during the past nine years:

1927	*1928*	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*
$9,882	$7,420	$7,282	$6,539	$6,762	$6,157	$6,134	$5,807	$5,747

During the year, it was necessary, with the consent of the donors, to use $2,500.00 of the amount contributed, to supplement the personal service payrolls, leaving only $3,247.00 to enrich the library, the herbarium, and the collection of living plants. This did not mean foregoing luxuries, it meant going without necessities. The contributions have fallen off 42% from 1927 to 1935.

Edward Jackson Bequest *

Mr. Edward Jackson, a resident and merchant of Brooklyn, died on April 28, 1935. In his will he left a bequest of $5000 to the Brooklyn Institute of Arts and Sciences for the use of the Botanic Garden, to be known as the "Edward Jackson Fund." A substantial part of the estate was represented by mortgage certificates. According to our latest information, the value of these certificates was being determined and the estate was not settled.

* For form of bequest to the Brooklyn Botanic Garden, see the page preceding the frontispiece of this Report.

Tax Budget and Private Funds

The total maintenance Budget for 1935 was $171,151.71.

The Tax Budget appropriation by the City for maintenance was as follows:

	Requested	*Granted*	*Change from 1934*
Personal Service	$69,266.00	$69,266.00	$1,445.78 increase
Other Codes	13,746.00	13,325.00	1,554.03 decrease
	$83,012.00	$82,591.00	$ 108.25 net decrease

The Private Funds Budget was $88,560.71 as against $85,-550.99 in 1934, an increase of $3,009.72.

The Private Funds Budget was $5,969.71 more than the Tax Budget.

The Total Budget for 1935 was $2,601.47 more than for 1934, and $57,715.56 less than for 1930.

For the past eight years the percentages of the two budgets have been as follows:

	1928	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*
Tax Budget	48%	43%	44%	48%	50%	47.2%	49.2%	48.26%
Private Funds ...	52%	57%	56%	52%	50%	52.8%	50.8%	51.74%

Needs

In previous reports specific needs have been noted. The great need of the Garden at present is a permanent fund that will yield an income of not less than $50,000 restricted only to the scientific and educational work of the Garden. The need would be met by adequate separate endowments for research, the library, the herbarium, living plants, publication, curatorships, *et cetera*.

Imponderables

The most essential thing about a scientific or educational institution, such as the Brooklyn Botanic Garden, is usually not recorded in an annual report, chiefly because it is almost impossible to report it. I refer to the intangible items of *esprit de corps;* the ideals, defined and undefined, which actuate the members of the personnel to their best accomplishment; the intention to the

fullest public service, usually taken for granted but not stated nor talked about; the spirit of cooperation with other institutions and organizations and with the general public; the intangible, and therefore unrecorded, helpfulness of trustees and other friends. It is these things, more than anything else, that give an institution its character and without which none of its work can be most effective. They are the most precious assets in all aspects of human life. Whatever of success has attended the efforts of the Brooklyn Botanic Garden personnel during the past twenty-five years is due in largest measure to these imponderables which have permeated its work. They afford the greatest helpfulness and encouragement to a director and staff; in them a board of trustees should find its most solid satisfaction.

Appended Reports

The Reports on Research for 1935, the departmental administrative reports, and Appendices 1–12 follow as integral parts of the Annual Report.

Respectfully submitted,

C. Stuart Gager,

REPORTS ON RESEARCH FOR 1935

Plant Pathology

By George M. Reed

Influence of the Growth of the Host on Smut Development

Problems of fundamental interest are associated with the establishment of the parasitic relation between the smut fungus and its host plant. Of special significance is the influence of various external factors on both host and parasite, which must be considered from two distinct aspects.

1. Influence of environal factors on the penetration of the parasite into the host plant. Following the process of inoculation, there must be a penetration of the parasite into the host tissues. Usually the oat smut fungus enters in the early seedling stage. Extensive investigations have clearly established that such en-

vironal soil factors as temperature, moisture, reaction and physical condition, are determining as to whether penetration will take place. These factors, of course, may exert an influence on the germination and early growth of the smut fungus as well as of the host plant and, in any given case, it may be impossible to determine which is most influenced. Our investigations have developed methods which have proved very successful in securing infection of susceptible varieties, since 100 per cent. of the plants are regularly infected. The favorable combination of conditions is a soil with a relatively low moisture content and a temperature of about 20° C. Sand of a uniform texture has proved an excellent medium.

2. Influence of the subsequent growth of the host plant on smut development. Following penetration, the parasite must establish a definite relation with the cells of the host in order to complete its life cycle. In such fungi as the rusts and powdery mildews, the period necessary for the development of the parasite from the time of penetration to spore formation is comparatively short, requiring only a few days. This period, however, is greatly influenced by external conditions. In the oat smuts, the smut fungus grows in the oat plant tissues until the latter develops its flowers, a period of weeks or months from the time of the germination of the seed. Thus the two organisms are developing together through a relatively long period of time.

During the past year extensive experiments have been made on the second phase of these problems. The influence of external factors on penetration were eliminated by germinating the seed at 20° C. with a moisture content of about 20 per cent. The seedlings germinated and pushed through the sand in about four days and in six to seven days were ready for transplanting. The problem then was to determine whether alterations in the rate and extent of growth of the host plant would have any effect upon the ultimate development of smut.

Definite physiologic races of both loose (*Ustilago avenae* (Pers.) Jens.) and covered (*U. levis* (K. & S.) Magn.) smuts of oats were used for inoculating strains of oat varieties whose behavior towards them had been well established. The Missouri race of loose smut was used to inoculate Gothland and Scottish Chief, the

former being very susceptible to it, regularly giving 100 per cent. infection. Scottish Chief, however, is only moderately susceptible; while some plants are infected in each experiment, 100 per cent. infection is practically never obtained.

Two races of covered smut were used. The Missouri race was used to inoculate Monarch, which is completely susceptible, and Danish Island, which usually gives only a small number of infected plants. The Fulghum race of covered smut is characterized by its ability to infect Fulghum, a variety of the red oat group, and also Black Mesdag, a variety extremely resistant to all other known races of smut. Only rarely does either of these varieties give 100 per cent. infection.

Three different sets of experiments were carried out.

1. The influence of length of day and sodium nitrate on the growth of the host and the development of the smut mycelium was tested. There were grown four sets of cultures, two being supplied with sodium nitrate and two without. The experiments were started about the middle of January and continued until all the plants had headed out. One set of cultures was illuminated for additional hours in the late afternoon and the other was grown without artificial light.

There were marked differences in the time required for the plants to reach the stage of heading, when the presence or absence of infection is readily determined, since the flower parts are completely replaced with the smut spores. The illuminated plants without nitrate grew rapidly, heading in about ten weeks, but showed practically no stooling. The illuminated plants supplied with nitrate headed a few days later. They were taller and stooled out to some extent. It was several days later before the non-illuminated cultures headed out, the ones without nitrate being slightly earlier. The cultures of these plants were much taller and stooled out more than those of the illuminated series, the plants supplied with sodium nitrate especially producing a very rank and abundant growth.

2. Another series of cultures was grown in a comparatively poor soil to which various chemicals were added. To one set of pots a full nutrient solution, including nitrate, potash and phosphate, was supplied. In comparative series, there was a deficiency

of potash, phosphate or nitrate. Again, there were decided differences in the time of heading and extent of development of the plants in the different series, those supplied with nitrate being exceptionally luxuriant.

3. A third series was grown in sand cultures to which were added the various chemicals, nitrate, potash and phosphate. In one set of cultures the full nutrient solution was supplied while in the other there was a deficiency of potash, phosphate or nitrate. These cultures also showed striking differences between the plants. Those grown without the nutrient solution were very short with no stooling, while those supplied with a full nutrient solution or an excess of nitrate were tall, some stooling out to a slight extent.

In all these experiments, then, there were very decided differences in the rate of growth and development of the host plants. The interval of time between planting and heading also varied. It was found, however, that the varieties fully susceptible to a particular race of smut showed practically complete infection in every series. There were minor variations in the percentage of infection of the moderately susceptible varieties, but no definite indication that these were correlated in any way with particular changes in the growth of the host.

The investigations on the influence of the growth of the host on smut development are supported in part by a grant from the Penrose Fund of the American Philosophical Society.

Physiologic Races of the Oat Smuts

It is very important to avoid the erroneous assumption that all collections of loose and covered smut of oats are similar in their ability to infect oat varieties. Variations occur in the physiologic behavior of different collections which are of equal or greater importance than morphological characters such as size, shape, spore surface, and so on. These physiologic differences are recognized by the difference in the ability of collections of the parasite to attack species and varieties of oats.

This phenomenon of host specialization is very widespread among the parasitic fungi. Such races have been demonstrated in practically all of the groups, and show great differences in their physiologic behavior. During the past year we have published

a paper discussing the results which have been secured in this general field in the course of the last few years.

Experiments extending over a period of years have demonstrated the existence of a large number of specialized races of both loose and covered smuts of oats. Several new collections received from Mr. T. R. Stanton, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Washington, D. C., have been tested during the past year. Most of these collections were made on varieties of the red oat group, which are commonly grown in the Southern States. Both species of smuts were represented by collections.

The results obtained confirm the high degree of specialization of both species of smuts. A large number of varieties belonging to the different species and sub-species of oats were inoculated with the various smut collections, and very definite evidence of specialization was obtained. Very few varieties or strains of oats were resistant to all of the collections which were used. The outstanding ones were Navarro, Victoria and Markton.

Probably there is no end to the number of races of both loose and covered smuts which can be isolated from collections obtained from various parts of the world. These races are of both a theoretical and a practical value. A very interesting problem is the relation between oat varieties derived from different species of oats and the specialized races of the smuts. One of the most significant practical problems has to do with the study of the inheritance of smut resistance in oat hybrids. Varieties differ in their reaction to specialized races; it is, then, necessary to use races whose behavior on the parental varieties is known in order to determine the mode of inheritance of the smut-resistant quality. In the practical problem of breeding oats for a given locality, it is also necessary to consider this question of physiologic specialization. A new strain may be developed in a region where it is entirely resistant to smut. When taken to another locality, however, where different races of the parasites exist, it may prove to be susceptible.

Studies on the Inheritance of Resistance of Oat Hybrids to Loose and Covered Smuts

The investigation of the inheritance of smut resistance in oat hybrids was continued. Experiments were carried out with the third, fourth and later generations of various hybrids which involved crosses between varieties of oats differing in their reaction to the Missouri races of the two smuts of oats.

Experiments with the Third Generation of Oat Hybrids.—Hybrid 80, Canadian X Monarch Selection, is a cross between Canadian, susceptible, and Monarch Selection, resistant to the covered smut. Extensive data on the reaction of the third generation progenies of this hybrid to this specialized race of covered smut were reported last year. A few additional progenies have been grown, and the results are comparable to those previously obtained. There were 30 third generation progenies, of which 4 were resistant, 18 segregating, and 8 susceptible. Resistant progenies are those which contain no smutted individuals; susceptible progenies regularly give a very high percentage of infection, frequently as much as 100 per cent.; segregating progenies are those which include 50 per cent. or less infected plants.

Hybrid 81 is a cross between Gothland, which is very susceptible, and Black Mesdag, which is resistant to the loose smut. Some additional data, supplementary to that reported a year ago, have been secured. There were 30 third generation progenies, of which 8 were resistant, 15 segregating, and 7 susceptible. These results are in harmony with those previously recorded for this hybrid.

Hybrid 82 is a cross between Danish Island and Monarch. Danish Island is susceptible to the loose smut, while Monarch is resistant. Monarch, however, is very susceptible to the covered smut, and Danish Island is only slightly so. There were two series of third generation progenies inoculated. In one series 180 third generation progenies were inoculated with loose smut, and 78 were classified as resistant, 79 as segregating, and 23 as susceptible. These results correspond fairly well with those recorded in the previous year. There was a conspicuous preponderance of resistant progenies in comparison with the susceptible, and accordingly, the behavior of this hybrid does not correspond fully with that of Hybrid 81.

The third generation progenies inoculated with the covered smut have shown a very different behavior. During the past year, 179 third generation progenies were grown, and only 1 of these was classified as resistant, 64 as segregating, and 114 as susceptible, thus confirming the data of the previous year. The noteworthy feature about the behavior of these hybrids to the covered smut is the almost complete absence of resistant progenies, combined with the great excess of those which may be classified as susceptible.

The results obtained with the third generation progenies, however, are in harmony with those secured for the second generation plants. A large number of these were inoculated and, altogether, 71.4 per cent. were infected. Probably the fact that one parent is fully susceptible to the covered smut while the other is moderately susceptible enters into the explanation for the facts obtained.

Hybrid 83 is a cross between Canadian and Black Norway. Canadian is very susceptible to both smuts, while Black Norway is somewhat susceptible to the loose smut but very resistant to the covered. There were 24 third generation progenies inoculated with the loose smut and most of these proved very susceptible; however, 5 gave percentages of infection below 50. The data are comparable with those obtained for the two parental varieties and for the few second generation plants which were inoculated.

There were 60 third generation progenies inoculated with the covered smut and 19 were classified as resistant, 31 segregating, and 10 susceptible. These results also harmonize with the data secured for the second generation, in which 64 plants were inoculated and 8 (12.5 per cent.), were infected.

Hybrid 84 is a cross between Scottish Chief and Black Mesdag, the former being moderately susceptible to loose smut and quite resistant to the covered, while Black Mesdag is resistant to both. There were nine different crosses represented. In the second generation there were 388 plants inoculated with the loose smut and 70 (18 per cent.) were infected. During the past year 269 third generation progenies were inoculated and 95 were resistant, 139 segregating, and 35 susceptible. On the basis of the previous results for the second generation, we might have expected a larger number of susceptible progenies.

Although both parental varieties are resistant to the covered smut, out of a total of 182 inoculated second generation plants, 9 (4.9 per cent.) were found to be infected. There were 180 third generation progenies inoculated and 67 of these contained infected plants. In nearly all cases, however, the percentage of infection was low, the highest obtained being 70.5.

Hybrid 85 is a cross between Black Mesdag and Danish Island, the latter being susceptible to the loose smut, while the former is resistant. There were 120 third generation progenies inoculated and 34 were resistant, 51 segregating, and 35 susceptible. These results are in line with those obtained in the second generation, when 118 plants were inoculated and 34 (28.8 per cent.) infected. The data also harmonize with such a hybrid as 81, referred to above.

Danish Island, on the other hand, shows a moderate susceptibility to the covered smut in contrast to the resistance of Black Mesdag. Of 131 second generation plants inoculated with this smut, 10 (7.6 per cent.) were infected. During the past year there were 60 third generation progenies grown and 31 were classified as resistant, 25 as segregating, and 4 susceptible, two of the latter giving 100 per cent. infection.

Hybrid 86 is a cross between Monarch Selection and Gothland, both varieties being fully susceptible to the loose smut and resistant to the covered. In the second generation 163 plants were inoculated with the loose smut and 152 (93.2 per cent.) were infected. There were 90 third generation progenies inoculated with this smut and a large number of them contained 100 per cent. infected plants, very few individuals in any progeny being found which showed no infection. Thus the high susceptibility of the two parental varieties is evident in both the second and third generations.

In the second generation 166 plants were inoculated with the covered smut and none was infected. A series of 90 third generation progenies was inoculated with this smut and not a single smutted plant was observed. Thus the complete resistance of the parental varieties to this smut appears in both the second and third generations.

Experiments with the Fourth Generation of Oat Hybrids.—A large number of fourth generation progenies of various hybrids

was grown. These were selected from the standpoint of their high resistance or susceptibility in the third generation. As a general rule, if the third generation progeny was resistant, the fourth generation descendants were also resistant. In a corresponding way, susceptibility among the third generation progenies was manifested in the following generation.

During the past year the extensive results obtained with hybrids between Fulghum and Black Mesdag were published. There were four crosses and second, third, fourth and fifth generation plants were inoculated with the Fulghum race of loose smut. In the second generation 500 plants were inoculated, of which 90 (18 per cent.) became infected. There were two groups of third generation progenies. One group included survivors from the inoculated second generation plants. When these were tested, 47 proved to be resistant, 89 segregating and 5 susceptible. The latter may be explained as due to escapes in the second generation. The second group of progenies descended from uninoculated second generation plants. These were classified as 27 resistant, 47 segregating and 24 susceptible. The data indicate that resistance is dominant and segregation occurs on the basis of a ratio of three resistant to one susceptible.

The most interesting results with the fourth and fifth generations were concerned with the resistant progenies. The resistance evident in the second and third generations was continued throughout the fourth and fifth generations.

Cultural Characteristics of the Oat Smuts

Mr. L. Gordon Utter has continued his studies on the characteristics of both loose and covered smuts of oats when grown on artificial media in flasks.

In the culture studies undertaken, both the single chlamydospores and conidia were originally isolated and cultured, successive transfers being made to new culture media from time to time. Observations were made on the color and topographic characteristics of cultures from two races of loose smut and three of the covered.

The results are in accord with those previously reported (*Brooklyn Bot. Gard. Record* **24**: 55, 56. 1935). Continued transferring of cultures in triplicate of the various races showed that the new

culture sets were different from the parental cultures. The variations, however, generally fell within a range characteristic for a given race. In some cases a set of cultures of a race proved to be quite uniform, while in other cases considerable dissimilarity was noted. Selections of cultures of several races frequently exhibited more uniformity than existed within individual sets of the different races. Neither loose nor covered smut can be separated on the basis of its behavior in artificial cultures. Further, the physiologic races cannot be definitely distinguished by these means.

In 1933, combinations of cultures were made involving 13 single conidial isolations of loose smut with 3 of the covered. Definite races of both smuts were used throughout. The various combinations were used to inoculate Gothland and Monarch oats, the former being highly susceptible to the loose smut but resistant to the covered, while the latter shows the reverse type of reaction. At harvest time it was found that 5 of the culture combinations had produced infection of the loose smut type, 3 on Gothland and 2 on Monarch.

The chlamydospores collected on these plants were used to inoculate oat varieties in 1934. The loose smut collected on Gothland was found to produce smutted plants, some of which were identified as loose smut and others as the covered. The loose smut type appeared on Gothland and similar reacting varieties, while the covered smut occurred on Monarch. The loose smut collected on Monarch produced a similar type on Gothland, and also produced a covered smut type on this same variety.

Again, all smut was collected from the host varieties and used in a series of experiments in 1935. In general, the results indicated that many of the loose smut collections produced infections of the loose smut type on Gothland, while some of the covered smut collections produced covered smut only on Monarch. A few cases, however, were noted in which Monarch was found to be severely infected with a loose smut type and, further, a covered smut type of infection was found to occur on Gothland. The evidence thus indicates that, through the combination of the original cultures, new types of smut have arisen—a loose smut capable of infecting Monarch, and a covered smut capable of infecting Gothland.

Sorghum Smut Investigations

Miss D. Elizabeth Marcy has continued her studies on the inheritance of resistance of various sorghum hybrids to both the covered (*Sphacelotheca sorghi* (Link) Clinton) and loose (*S. cruenta* (Kühn) Potter) smuts of sorghum. Data for a large number of hybrids involving different types of varieties of sorghum from the standpoint of resistance and susceptibility were obtained.

First Generation Plants.—Since it is rather easy to secure a considerable number of first generation plants of sorghum hybrids, it was possible to inoculate these and determine their smut reaction. There were seven hybrids involving the resistant Feterita, or Milo, with susceptible varieties, and it was found that the first generation plants of hybrids with Feterita, inoculated with covered smut, were susceptible, while those in which Milo was one parent were resistant.

First generation plants of a cross between Feterita and Dawn Kafir were inoculated with loose smut and they were found to be susceptible. In contrast, first generation plants of hybrids between Milo and Dawn Kafir, inoculated with the loose smut, were resistant.

Second Generation Plants.—There were grown 596 second generation plants belonging to twenty hybrids, inoculated with covered smut. These represented three types of crosses: susceptible × susceptible, resistant × resistant, and resistant × susceptible. Two crosses between susceptible varieties gave over 90 per cent. infection. Hybrids between the resistant varieties Feterita and Dwarf Yellow Milo gave a very few infected second generation plants (4.1 per cent.). Crosses between the resistant Milo and susceptible varieties gave 5.8 to 16.6 per cent. infection. On the other hand, crosses between Feterita and susceptible varieties gave 42.9 to 80 per cent. infection. These results confirm the genetic interpretation previously made that resistance is dominant in the Milo crosses and susceptibility in the Feterita crosses. In these experiments the susceptible parental varieties gave from 48.1 to 96.6 per cent. infection. The resistant Milo remained entirely free from smut. Feterita, however, although free from typically smutted heads, contained from 17.8 to 44.1 per cent. blasted heads.

This peculiar type of infection also appeared in all the hybrids involving Feterita and susceptible varieties.

A series of 606 second generation plants of the same twenty hybrids was inoculated with the loose smut. The inoculated plants of the hybrid between the resistant Feterita and Dwarf Yellow Milo were all normal. Two hybrids between susceptible varieties gave 55.3 and 61.5 per cent. infection. When Milos were used as resistant parents in crosses with most susceptible varieties, the percentage of infection ranged from 20.5 to 66.6 per cent., and when Feterita was used as the resistant parent the range of infection was 0 to 10.7 per cent. These results agree with those obtained over a period of years, and suggest that in the Milo hybrids susceptibility to the loose smut is probably due to a dominant factor, while in the Feterita hybrids it is due to a recessive one. The reaction of the different hybrids to the two smuts is exactly opposite.

The results with a hybrid between Feterita and Dawn Kafir are especially interesting, since 53.7 to 66.6 per cent. of the inoculated plants were infected. The strain of Feterita used as the parent in this cross was different from the one used in all the other crosses. Whether the difference in behavior of the hybrids is due to the difference in the Feterita strain or to the susceptible variety, Dawn Kafir, remains to be determined. The hybrid between Milo and Dawn Kafir is also interesting, since only 4.5 to 9.0 per cent. of the second generation plants were infected.

The susceptible parental varieties gave from 5.8 to 81.3 per cent. infection with the loose smut. One strain of Feterita was entirely free, while the other gave as high as 17.1 per cent. infection.

None of the blasting characteristic of Feterita when inoculated with the covered smut appeared in any variety or hybrids inoculated with the loose smut.

Third Generation Plants.—Plants belonging to 98 third generation progenies of different hybrids were grown in order to throw further light on the problem of inheritance of resistance to both the loose and covered smuts.

In 1934, 64 second generation plants of a hybrid between Dakota Amber Sorgo and Feterita gave 44 typically smutted plants, 19 blasted, and 1 normal. Third generation progenies

were grown from a few seed obtainable from 6 of the blasted plants which did not contain any evidence of smut spores. Of these, 4 progenies contained more than 50 per cent. blasted heads with no evident smut spores; 1 progeny produced heads with a few blasted spikelets; and 1 gave 41.6 per cent. typically smutted heads, the rest being blasted. The blasted plants in these progenies were quite uniform as to the extent of the blasting. A further interesting point is the fact that a higher percentage of smut was obtained from the progeny of a blasted plant than has ever been obtained for Feterita.

Fifteen progenies of the same hybrid, descended from survivors of second generation plants inoculated with the loose smut, were inoculated with the same smut and, on the basis of infection results, could be classified in three distinct groups: 9 progenies free from smut, 6 giving from 4.3 to 17.6 per cent. infection, and 1 giving more than 50 per cent. infection.

Out of a total of 38 third generation progenies of a cross between Dakota Amber Sorgo and Dwarf Yellow Milo inoculated with the loose smut, 7 gave more than 50 per cent. infection, 22 from 5 to 50 per cent., and 9 contained no smutted plants. These descended from uninoculated second generation plants. The figures indicate a 1:2:1 ratio. In 1934, sister progenies of these were grown, inoculated with the covered smut, and it is interesting to note that there is no indication of any correlation between susceptibility and resistance to the two smuts. A progeny might be resistant to one and susceptible to the other.

There were 10 third generation progenies of a hybrid between two susceptible varieties grown. These descended from normal plants which had survived inoculation of the loose smut in the second generation. Of these, 8 gave from 56.5 to 95.2 per cent. infection, the others 19 and 32 per cent. Thus at least 8 of the second generation plants were genetically susceptible and had merely escaped infection, and it is probably that the other normal second generation plants were also escapes.

A total of 418 plants belonging to 29 third generation progenies of a cross between Feterita and Dwarf Yellow Milo were inoculated with the loose smut and none of them was infected. These plants descended from second generation plants which had also

been inoculated with this smut. The results indicate that Feterita and Dwarf Yellow Milo contain the same factor or factors for resistance to the loose smut.

Influence of Environal Factors on Sorghum Smut Infection.—A large number of experiments were carried out with the covered smut in order to determine the influence of environal factors on infection. One of the difficulties in thoroughly studying the inheritance of smut resistance is the variation which occurs in the infection of so-called susceptible parental varieties. The present experiments involved temperature ranges from 15 to 30° C., variations in the moisture content of the sand from 10 to 15 per cent. of the water holding capacity, and the comparison of water and 2 per cent. sucrose solution. The sand reaction was approximately neutral.

Throughout the series the highest infections of the varieties tested were obtained usually at the 10 per cent. moisture at all the different temperatures, and for both the water and sucrose series. At the lower temperatures the infections obtained in the water series were usually higher than those obtained in the sucrose series. At the medium temperatures the infections were higher in the sucrose series at the lower moisture percentages, and in the water series at the higher moisture. At the high temperatures the percentages of infection were generally higher in the sucrose series throughout. The occurrence of characteristic blasted plants of Feterita follows the behavior of the typical susceptible varieties, except that the highest percentages of infection were obtained at the high temperatures, while the highest infections of the susceptible varieties were obtained at lower temperatures. Further, the sucrose solution was more conducive to high infection in Feterita than water, except at the lowest temperatures.

The results indicate clearly that the number of infected plants of a susceptible variety, inoculated with the covered smut, may vary from 0 to 94.1 per cent., depending upon the environal conditions provided during the germination period.

We are again indebted to the courtesy of Director H. B. Knapp and his associates, State Institute of Applied Agriculture on Long Island, Farmingdale, L. I., for land and facilities for conducting these extensive experiments with the sorghum smuts. Approxi-

mately one-half an acre of land was placed at our disposal, which made it possible to grow approximately 10,000 plants.

Graduate Students and Independent Investigators Enrolled During 1935

Mr. Paul F. Brandwein, a graduate student of New York University, has enrolled for advanced work in plant pathology. He has undertaken a study of the influence of inoculation and infection on oat plants by the loose and covered smuts.

Dr. Marie E. Conklin continued her investigations on the bacteria which form tubercles on the wild legumes. Her studies involved the problem of the cultural characteristics of the bacteria isolated from different plants, and also their capacity for infecting. Her results were presented as a partial fulfillment of the requirements for the degree of Doctor of Philosophy at Columbia University.

Dr. James N. Currie utilized the facilities of the laboratory for cultural studies on some different types of algae.

Dr. Elva Lawton, a member of the Biology Department of Hunter College, has continued her studies on regeneration and polyploidy in ferns.

The Iris

By George M. Reed

Farmingdale Iris Garden

The State Institute of Applied Agriculture on Long Island and the Brooklyn Botanic Garden have cooperated in developing an Iris Garden at Farmingdale, Long Island, the location of the former institution. The two institutions have common interests in the horticultural field and have combined their efforts and facilities for certain purposes.

The Brooklyn Botanic Garden has long been concerned with an iris project in cooperation with the American Iris Society. However, it has lacked the space necessary for the growing and testing of a large number of varieties and types, as well as other desirable conditions for the maintenance of the project on its own grounds.

The Institute, on the other hand, has ample space, good growth conditions and as the center of horticultural development on Long Island as well as an educational institution, it has marked interest in such horticultural features.

Accordingly, in the spring of 1935, the two institutions entered into an informal agreement by which there has been set up on the grounds of the State Institute the "Farmingdale Iris Garden." The iris species and varieties have been furnished by the Brooklyn Botanic Garden. The Iris Garden, however, is to be maintained by the Institute in suitable surroundings, and is to be available for study and inspection to all persons and organizations interested.

The Iris Garden is intended as a display garden for collections of representative varieties of bearded and beardless iris. It consists of about one acre, including the beds for the iris and the background of shrubs. The garden has an excellent location on the Institute grounds, being adjacent to the approach to the buildings of the Institute from the main highway.

The plans for the landscaping and the general arrangement of the iris beds were drawn by Mr. Harvey Gray, Instructor of Landscape Gardening at the Institute. The iris beds, together with the paths, occupy an elliptical area approximately 180 feet east and west and 132 feet north and south. The main planting area is separated into four sections by broad paths running at right angles to each other. The beds are 4 feet wide, elliptical in shape and arranged concentrically, being separated by paths of the same width. The inner bed, surrounding a fairly large lawn, is devoted to the Dwarf Bearded, Intermediate Bearded and Pogocyclus iris. The next three beds are filled, in order, with the low, medium, and high, Tall Bearded iris. The two outer beds contain the Beardless species and varieties, more than half of these beds being occupied by the Japanese iris. The number of varieties planted in the garden is as follows:

Dwarf Bearded	16
Intermediate Bearded	31
Tall Bearded	326
Japanese	245
Siberian	50
Southern	45
Pogocyclus	12
Species—miscellaneous	34

There are from three to twelve plants of each variety in the Tall Bearded beds, the newer varieties being represented by the smaller number of plants. Generally, each variety of Japanese, Siberian, Southern, etc., is represented by six plants. Within each group, the iris are arranged alphabetically.

The iris plantings are to be surrounded by a background of shrubs. These will be arranged according to height, with a greater massing of plants at some points than at others. Immediately in front of the shrubs provision is made for planting special groups of iris, such as bulbous types and other species which do not fit well into the main series of beds. It is also planned to arrange color groupings of varieties of Tall Bearded and other kinds in this area.

Facilities have also been provided by the Institute in another part of its grounds for growing iris seedlings and propagating special varieties. One of the important phases of the iris project in cooperation with the American Iris Society is that of iris hybridization. A representative collection of species and varieties, principally of the Beardless type, has been built up, and many crosses have been made. Space is necessary for growing the seedlings to maturity, a period of two or more years. Facilities for growing these at the Botanic Garden have been extremely limited. The Institute has placed a considerable area at the disposal of the Garden for this purpose.

It is essential that special varieties of iris be propagated. Our Japanese iris collection, especially, includes a large number of rare kinds, and it is desirable that they be increased and distributed to those who are interested in these plants. It has not been possible to do this successfully at the Botanic Garden on any considerable scale. The arrangement with the Institute, however, makes it feasible to propagate them. In the past we have exchanged a large amount of material of Japanese iris for Tall Bearded and other kinds, and in this way have been able to build up our collection of types of iris.

Iris Thrips Control

The iris plantings at the Brooklyn Botanic Garden, especially the Japanese varieties, for a number of years have been severely infested with thrips, an insect which has done extensive damage

to the flowers, as well as disfiguring the foliage. From time to time experiments have been carried out in order to find some method of control. During the last two years extensive experiments, involving particularly the use of the hot water treatment, have been undertaken in cooperation with Dr. C. A. Weigel and Dr. Floyd F. Smith of the Division of Truck Crop and Garden Insect Investigations, Bureau of Entomology and Plant Quarantine, Washington, D. C. The plants have been dug and treated at the Botanic Garden. However, in order to carry the experiments to a successful conclusion, it was necessary to find facilities at some distance so that the plants could be grown free from further infestation following their treatment. Through the courtesy of the officials of the State Institute of Applied Agriculture at Farmingdale, it was possible to secure the necessary land on the Institute grounds.

In April 1935, an extensive series of varieties was treated, including a large number of Japanese and a smaller number of the Siberian, Southern, and Tall Bearded groups. These experiments were intended to give preliminary information as to the effectiveness of the treatment in killing the thrips organism and determining the extent of injury, if any, to the varieties thus treated. In the late summer and fall a large number of additional treatments were made; in fact all the plants set out in the newly established Farmingdale Iris Garden were treated by the hot water method.

Forest Pathology

By Arthur Harmount Graves

Chestnut Breeding Work in 1935

Since there are some to whom this report will come for the first time, a restatement of the whole project seems best, in the interest of clearness. Our aim is to develop a tall-growing, disease-resistant chestnut tree of a type suitable for timber, to replace the valuable native species which has been killed off by the fungus *Endothia parasitica.* To this end we started six years ago to cross Japanese chestnuts (comparatively low-growing trees but disease-resistant) with the American species (tall-growing but sus-

ceptible to disease.) We believed that among the offspring some individuals would inherit the tallness of the American parent plus the disease-resistance of the Japanese parent.

Some of the Results to Date.—Our best hybrid so far, a Japanese-American, with now four years of growth to its credit, stands 11 feet 2 inches high. (Fig. 6.) The normal height for a native American chestnut would be about 4 feet, or one foot per year. Many other Japanese-American hybrids of the four year age class are now from 6 to 8 feet in height.

In 1935 we made 5 new crosses and 3 new reciprocal crosses.

Whereas, heretofore, we have used the American chestnut as the male parent only, we demonstrated this year that it is entirely feasible to make reciprocal crosses, using the American chestnut as the female parent. The American chestnut used in this case consisted of ordinary, wild, flowering shoots coming from the base of cut stumps or of dead trunks.

The early blooming, at the age of 3 years, in 1934, of three of our Japanese-American hybrids, put an entirely new aspect on the whole breeding problem. This blossoming occurred on a much wider scale in 1935. Fourteen of the Japanese-Americans (4 yrs. old) bloomed, eight of them bearing only male flowers. As we said in our last year's report, we do not expect that this precocious blooming (evidently a manifestation of hybrid vigor) will be maintained at the same rate in future generations; but nevertheless it means that we can encompass many generations in a reasonably short time.

We now have, growing on the trial grounds at Hamden, Conn., 116 of our own hybrid trees from various crosses, representing eight combinations (p. 69) of chestnut species and varieties, seven of which were made in 1934 for the first time. The 2 nuts resulting from the crossing of the 3-year old Japanese-American with American pollen germinated, and this second generation is growing well. We have, in all, seven species of chestnut growing on the plantations, and these, plus the varieties and hybrids, make a total of 452 trees.

Outside Assistance.—For the year 1935, we received a grant-in-aid from the American Academy of Arts and Sciences to help defray the cost of the undertaking. With this help we were able to keep a man in the field during the months of May, July, and Au-

gust, and for a large part of June and September. The cost of a sprayer, spray materials, labels, cloth and paper bags, manure, horse or tractor plowing and cultivation was also defrayed from this fund. Part of the cost of transportation in survey work, etc. was paid by the Division of Forest Pathology, U. S. D. A. This Division, as usual, supplied us with pollen of the American chestnut from the nurseries at Bell, Md. Mr. R. B. Clapper, Senior Scientific Aid of the Division of Forest Pathology, personally visited our plantation on July 1 and 2, bringing the American pollen with him from Washington, and during his stay assisted us in the cross pollination work. It is a pleasure to be able to acknowledge here the invaluable assistance from these sources and to thank the many individuals who have given us helpful information.

New Hybrids.—In 1934 we began crossing other species, in addition to the Japanese and American, in order to get as many new combinations as possible, each cross being made with a definite purpose in mind. (See Brooklyn Bot. Gard. Record **24**: 61, 62. 1935.) Thus eight new crosses were made in 1934: we have seedlings from seven of these now growing on our trial grounds at Hamden.

The following table gives the results of our hybridization work in 1935. The figures at the extreme left, in parentheses, are given for convenience in referring later to a particular combination. Those combinations marked with a single asterisk are, as far as we can ascertain from the literature, new to science. Those marked with a double asterisk, while not new combinations, are reciprocal crosses which, we believe, have never been made before. As is the generally recognized custom, the name of the female parent is given first.

Hybrids of 1935

Long Island (New York) Hybrids

(In all cases using American chestnut *Castanea dentata* (coppice) as female)

	No. of Nuts	
(1)**	49	American chestnut crossed with Chinese chestnut (*C. mollissima*)
(2)**	11	American chestnut crossed with "S8" †

† S8 is the result of a cross made by Dr. Walter Van Fleet of the U. S. D. A.; apparently it is a combination of *Castanea crenata* and *C. pumila*.

FIG. 6. Japanese-American chestnut (*C. crenata* × *Castanea dentata*) at chestnut trial grounds, Hamden, Connecticut. 11 feet 2 inches in height, and 2⅝ inches in diameter at base, at the end of its fourth year of growth (Oct. 1935). The normal height-growth for native American Chestnut is 1 foot per year. This tree has never been fertilized and very little pruned. During 1935 it grew 4 feet 2 inches. (8809)

Hamden (Connecticut) Hybrids

(Using various combinations)

(3)* 5 Smith hybrid (1931) (Jap. × Amer., i.e. *crenata* × *dentata* 4 yrs.) crossed with Smith hybrids (of similar history)

(4) 1 Smith hybrid (1931) crossed with American chestnut (*C. dentata* from U. S. D. A. and North Haven, Conn.) ‡

(5)* 3 Smith hybrid 1931 crossed with Chinese chestnut (*C. mollissima*, 9 yrs.)

(6)** 7 Chinese chestnut (*C. mollissima*, 9 yrs.) crossed with Smith hybrid 1931

(7) 13 Chinese chestnut (*C. mollissima* 7 yrs.) crossed with American chestnut (U. S. D. A. and North Haven, Conn.)

(8) 12 Chinese chestnut (*C. mollissima* var. *Mammoth*, 7 yrs.) crossed with American chestnut (*C. dentata*) (U. S. D. A. and North Haven, Conn.)

(9) 25 Chinese-chinquapin hybrid (*C. mollissima* × *C. pumila*, 7 yrs.) crossed with American chestnut (U. S. D. A. and North Haven, Conn.)

(10) 10 Japanese Forest Type (*C. crenata* var., 7 yrs.) crossed with American chestnut (U. S. D. A. and North Haven, Conn.)

(11)* 1 Japanese (*C. crenata*, 4 yrs.) crossed with Smith hybrid 1931

(12)* 3 Japanese (*C. crenata*, 4 yrs.) crossed with "S8" (9 yrs.)

(13)* 1 Japanese Forest Type (*C. crenata* var.) crossed with Chinese Chinquapin (*C. Seguinii*)

(14) 15 "S8" (9 yrs.) crossed with American chestnut (U. S. D. A. and North Haven, Conn.)

(Total) 156 hybrid nuts

The following notes about these crosses may be of interest. The figures in parentheses (as explained above) refer to the particular combination under discussion.

(1) and (2). *Long Island Hybrids.*—The rank and file of our hybrids are Japanese-Americans (*C. crenata* × *C. dentata*), derived during the years 1931, 1932, and 1933 by pollinating females on splendid specimen trees (mostly pure Japanese) on private estates on Long Island, using American chestnut pollen furnished us through the Division of Forest Pathology, U. S. D. A., at Washington, D. C. It is possible that hybrids of somewhat differ-

‡ For the second and third pollinations with American pollen, catkins were used from wayside coppice shoots at North Haven, Conn.

ent nature might be obtained by reciprocal crossing,* i.e., by using the American chestnut as the female and the Japanese as the male.

We had already received a good deal of information from various sources about American chestnuts in this vicinity which were bearing flowers. But in order to canvas the field more thoroughly, we sent a letter to the editor of the *New York Times* asking for information about blossoming (or fruiting) American chestnuts within 100 miles of New York City. This letter was printed on the editorial page of the *Times* for February 22, 1935. As a result, we received forty-two letters giving us information of trees in many states, including Massachusetts, Connecticut, New Jersey, Pennsylvania, and even Virginia, besides many in New York. Last spring we visited as many as we could of those localities which were nearby. Most of them were impracticable for various reasons: we finally chose a wooded tract in the "Half Hollow Hills" district of the township of Huntington, on property occupied by Mr. J. Hager. Information of this locality was sent to us by Mr. Harold E. Willmott of Huntington, N. Y., and we are glad to take this opportunity of thanking Mr. Willmott and Mr. Hager for their cordial cooperation and interest.

While I was occupied at Hamden, crossing the trees on the plantation there, I sent pollen by mail to my assistants, Miss Hester M. Rusk and Miss Hilda Vilkomerson, who crossed these native American trees at Half Hollow Hills. As a result of their work we harvested in October 60 nuts, as shown in (1) and (2).

(3) This appears to be a good way of deriving a plentiful supply of a new generation comparable to an F_2 generation. Since the chestnut is practically self-sterile,† it is impossible to get large numbers of true F_2's easily and quickly.

(4) This cross was made in 1934 for the first time. Two trees of this second generation are now growing at Hamden, Conn.

(5) This would seem to be a very desirable combination. The Chinese species possesses undoubted disease-resistant characters, which as far as possible should be incorporated into our hybrids.

(6) The reciprocal cross of (5).

* DeVries found that the reciprocal hybrids of *Oenothera biennis* and *muricata* differed. See Bateson, Problems of Genetics. 1913. p. 107.

† It is not entirely self-sterile: in a few cases we have succeeded in selfing.

(7, 8, and 9) Done in 1934 for the first time, but in the case of (8), none of the hybrid nuts germinated. It seems best to make as many crosses as possible between the Chinese and American, because of the former's disease-resistant quality.

(10) Done in 1934. A desirable cross because of the disease-resistance of the Japanese.

(11 and 12) In December, 1931, Dr. G. M. Reed of this Garden received a quantity of Japanese chestnuts from Mr. S. Tanaka of Shizuoka, Japan. About half of these nuts were given to us. They germinated well and were set out in the spring of 1932 on our Hamden plantations. Last June the first of the lot bloomed. The nut in this case came from Ohara in the vicinity of Kyoto, and belongs to the class of what the Japanese term "*Chuguri*" or nuts of medium size. I crossed it with pollen from one of our Smith hybrids of 1931 (174B' 31) and also with pollen from S8.*

As a result of the first crossing we got one nut, and of the second, 2 burs yielding 3 fine nuts. It is perhaps doubtful whether we should call the latter combination new, for in 1934 we successfully crossed S8 with the Japanese Forest Type chestnut. The latter, however, is a distinct variety, and in any case this is a reciprocal cross (i.e. using the Japanese, instead of S8, as the female) and is therefore entirely new. This Kyoto chestnut tree was 4 feet 11 inches tall on October 1, 1935.

(13) *C. Seguinii,* the Chinese Chinquapin, although a low, shrubby little plant (in our strain), blooms from June until frost, and bears quantities of small burs strung along the stems, in effect like a large-beaded necklace. Moreover, they ripen progressively, the younger ones being at the upper end. This prolific character and the long blossoming period are great assets: we are trying to work them into other species by crossing. Incidentally, our seedlings of Chinese chestnut crossed with *Seguinii* in 1934 are doing well.

(14) This is an important cross (made for the first time in 1934), for by it we hope to combine the disease-resistant character of S8 as well as its precocity and great fruitfulness, with the timber character of the American chestnut.

Data on Growth Rates for Hybrid Chestnuts Now Growing at

* For composition of S8, see footnote, page 64.

Hamden.—We have, in all, 116 of our own hybrids growing at Hamden. The data on the average heights of these different hybrids and their growth during 1935 are presented in the following table.

TABLE OF GROWTH RATES OF HYBRID CHESTNUTS AT HAMDEN, CONNECTICUT, 1935

Name	Number of Trees Living October	Average Height October	Average Mean Length Growth 1935	Average Maximum Length Growth 1935
Folk 1931				
crenata × dentata	1	4 ft. 6 in.	10 in.	19 in.
Hammond 1931				
crenata × dentata	4	6 ft. 8 in.	12 in.	26 in.
Smith 1931				
crenata × dentata	46	5 ft.	13 in.	22 in.
Winthrop 1931				
crenata × dentata	2	4 ft. 2 in.	10 in.	18 in.
Smith 1932				
crenata × dentata	23	2 ft. 6 in.	9 in.	16 in.
Hammond 1933				
crenata × dentata	3	2 ft. 9 in.	16 in.	22 in.
Minturn 1933				
crenata × dentata	11	3 ft.	13 in.	22 in.
Graves 1934	(26)			
S8 × crenata (forest type)	7	10 in.	—	—
S8 × dentata	1	4 in.	—	—
mollissima × dentata	8 (−2)*	9 in.	—	—
mollissima × Seguinii	5	8 in.	—	—
crenata (forest type) × dentata	2 (−1)*	10 in.	—	—
(moll.-pumila) × dentata	1 (−1)*	—	—	—
Smith Hybrid 1931 × dentata	2	11 in.	—	—
(Total)	116			

* Numbers in parentheses refer to seedlings cut off by rabbits but probably still alive.

Diseases at the Hamden Plantation.—As has often been declared by plant pathologists, winter injury (in the strictest sense, itself a disease) is the worst of all tree diseases. For, by killing or weakening some of the plant tissue, it furnishes the start or foothold for many a destructive disease induced by parasites. The truth of this statement is borne out by the situation at our plantation. The very severe winters of 1933–4 and 1934–5 killed outright or in part many of our trees. When only a part of the tree was killed, a way was left open for the entrance of the chestnut blight fungus or for other fungi.* The Spanish chestnuts were particularly affected by the cold, most of the Japanese forest type were considerably set back, and we find now that some of the highly cherished Chinese, that we thought extremely hardy, suffered from winter injury at the bases and consequently were attacked last year at these points by the blight. The Americans, however, evidently since they are descendants of a race which has been accustomed to such cold spells for many millions of years, proved to be extremely hardy, showing not the slightest sign of winter injury. The same is true of the Japanese-American hybrids, which apparently inherit (in most of our specimens, at least) the hardiness of the American parent.

Blight.—In a few cases Japanese-American hybrids were affected with the blight. This is, of course, to be expected, since, naturally, some of the crosses would inherit the susceptibility of the American parent. As we said in a former report, we are not trying to keep the blight away from any of our trees. Whether or not an individual is susceptible, is one of the facts we are striving to obtain. It is fortunate, therefore, that in the woods surrounding the plantation (formerly the home of many fine native chestnuts) there are many diseased chestnut shoots, so that the air of the plantation must be well supplied with *Endothia* spores. Thus the plantation is continually subjected to what may be termed a "passive" test. Later it may be advisable to subject each tree to an "active" quantitative test, i.e. by means of inoculation of the living bark with the fungus.

* It must not be inferred that chestnut blight develops only as a result of winter injury: the fungus may enter through any dying or dead tissue, or any wound in the bark caused in any way whatsoever.

Insect Injuries.—The unusually dry weather of May * was favorable to the growth and development of the tent caterpillar, maple worm, and inch worms of various kinds. These are all chewing, leaf-eating larvae. Spraying with lead arsenate did not seem to be particularly effective: in most cases we had to resort to more drastic methods. The chestnut louse, *Calaphis castaneae,* was noticed on July 16, and was finally entirely subdued by three sprayings with nicotine sulfate, the last dose being applied Aug. 28–9.

Disease Resistance of Chestnut Growing at High Altitudes.—In several cases reported to us, trees growing at higher altitudes (*e.g.* 1,500–5,000 ft.) are apparently free from disease. Whether this is due to disease resistance, or to isolation, or to some other cause or combination of causes, we are not yet prepared to state. It is possible it may have some connection with the known fact that the fungus grows more slowly in localities with a comparatively low mean temperature.† This whole question needs further careful experimental study.

In this connection it may be of interest to quote from a letter received last July from R. C. Ching, of the Lu-Shan Arboretum and Botanical Garden at Han-Po-Kou, Lu-Shan, Kiukiang, China.

"I took great pleasure in reading twice the Annual Report of your Garden of which Dr. Graves' report on Chestnut Breeding strikes me considerably in view of the fact that some of the Chestnuts he worked with are from China. *Castanea Seguinii* and *C. Henryi* are two of the Chinese species of the genus which are, according to the report, not hardy at your region. The seed of the two Chinese chestnuts were, I am of the opinion, collected from trees growing at lowland in East China. Here right in our garden, which lies at 4,000 ft. altitude, are growing spontaneously in great abundance these two chestnuts which have from time

* The total precipitation for New Haven, Conn., for May, 1935, was 1.7 inches, which is nearly 2 inches (1.99) less than the normal for this month. Only twice in the last thirty years have we had a drier month of May; namely, in 1926 and 1905. See monthly meteorological summary for May, 1935. U. S. Dept. of Agric., Weather Bureau, at New Haven, Conn.

† Stevens, N. E. The influence of certain climatic factors on the development of Endothia parasitica (Murr.) And. Amer. Jour. Bot. **4**: 1–32. 1917. ——— The influence of temperature on the growth of Endothia parasitica. Amer. Jour. Bot. **4**: 112–118. 1917.

immemorial survived from such severe winters as, for instance, that of 1930 with a temperature as low as 15° F. below zero, while normally the lowest temperature for months of December, January, and February here ranges from 5° to 10° F. below zero. It is not unlikely that seeds from this locality of the two chestnuts should prove hardy in your place."

Regarding the connection of winter injury with the blight, the behavior of the Chinese chestnuts at our trial grounds in Hamden is of interest. In my report for 1934 I said, referring to a certain strain of Chinese chestnut which we have had growing since and including 1929, "The Chinese chestnut, as far as blight resistance is concerned, is our finest stock. For the whole six years we have had these trees they have never shown a sign of blight." Last year, however, we found to our dismay that the extreme cold of the winters of 1932–3 and 1933–4 had been too much for them. Five had been partly winter killed at the base and were badly infected with the blight at this point: one had been entirely winter killed (not blighted) and did not even put out its leaves in the spring.

In view of this performance we were indeed glad to receive from Mr. Ching, during the fall, nuts of Chinese species (see p. 75) from the hardy trees at his arboretum. They have been planted, and if they germinate, the behavior of the seedlings will be watched with interest.

New Trees Planted.—We received in April, 33 one year old seedlings from the U. S. D. A., Division of Forest Pathology. The trees had all been grown from seed collected in China and Japan, as follows:

No. of trees	Species or variety	Source
3	*Castanea Henryi*	Seeds collected by Peter Liu in An Huei province, China, at about 32° N. Lat.
21	GM, GN, GO, GP, GQ, GR, GS; *Castanea crenata* forest types	Seed collected in various kens * in Japan, between 32° and 40° N. Lat.
6	MAU, MAW; *Castanea mollissima*	Seed collected by Peter Liu in Chekiang province, China, at about 30° N. Lat.

* A "ken" is a prefecture or territorial division in Japan.

No. of trees	Species or variety	Source
3	FP 530; *Castanea mollissima*	From seed obtained on the San Francisco market, said to have been collected in Chahar province, China (40°–42° N. Lat.) and forwarded to Tientsin by camel caravan.

These seedlings were planted out at Hamden on April 19 and, with one exception, finished the year in a thrifty condition.

Of the 80 "natural" nuts, *i.e.* those which had developed without artificial pollination in our own plantations and were planted out in the fall of 1934 in newly cleared forest land in "spots" 6 feet apart, only 10 germinated and developed young seedlings. Moles, field mice, and fungi got the rest. We filled up the blanks this fall with other "natural" nuts and planted about 100 in addition. This time we wrapped each nut in a slender cylinder (compressed at each end) of old and therefore somewhat weakened wire netting, in the hope of thus outwitting the rodents, and yet giving the plumule and hypocotyl an opportunity to get out of their prison.

Chinquapins.—We find that the chinquapin nuts which we received from the U. S. D. A. last year through the Plant Introduction Station at Savannah, Ga., should be called *Castanea Ashei,* not *C. pumila.* As our list of trees shows (p. 74), we have now 25 of these Ashe chinquapins growing on our plantation. This last fall (1935) we received other chinquapin species, as will be seen from the list.

The list of the total number of individuals of the various species, varieties, and hybrids now growing at Hamden, Conn., follows:

CHESTNUT SPECIES, VARIETIES, AND HYBRIDS GROWING AT HAMDEN, CONN.

1935

Name	Number of Trees
Castanea dentata—American Chestnut	44
C. sativa—Spanish Chestnut	75
C. crenata—Japanese Chestnut	40
C. crenata (forest type)—Japanese Chestnut var.	61
C. mollissima—Hairy Chinese Chestnut	44
C. mollissima var. Mammoth—Chinese Chestnut var.	2
C. Seguinii—Chinese Chinquaqin	9

Continued on next page

Name	Number of Trees
C. Henryi—Henry Chestnut	3
C. Ashei—Ashe Chinquapin	25
C. mollissima × *crenata* (U. S. D. A.)	8
C. mollissima × *pumila* (U. S. D. A.)	4
"S8"	2
"S8" selfed	2
C. crenata (Minturn) selfed	1
C. crenata × *dentata* (Folk 1931)	1
C. crenata × *dentata* (Hammond 1931)	4
C. crenata × *dentata* (Smith 1931)	46
C. crenata × *dentata* (Winthrop 1931)	2
C. crenata × *dentata* (Smith 1932)	23
C. crenata × *dentata* (Hammond 1933)	3
C. crenata × *dentata* (Minturn 1933)	11
C. mollissima × *dentata* (Hamden 1934)	8
C. mollissima × *Seguinii* (Hamden 1934)	5
C. crenata (forest type) × dentata (Hamden 1934)	2
(*C. mollissima* × *pumila*) × dentata (Hamden 1934)	1
(*C. crenata* × *dentata*) × dentata (Hamden 1934)	2
"S8" × *crenata* (forest type) (Hamden 1934)	7
"S8" × *dentata* (Hamden 1934)	1
Anonymous hybrid 1933	1
* "Naturals" 1934	15
Total	452

* These are from nuts on Chinese or Japanese trees, resulting from natural pollinations. (See p. 73.)

Nuts received from outside sources and planted in cold frames, fall, 1935.—

Oct. 1. *Castanea pumila* from U. S. D. A. nurseries at Bell, Md. Through Mr. R. B. Clapper, Division of Forest Pathology, U. S. D. A.

Oct. 15. *C. ozarkensis* from Fayetteville, Arkansas, from Prof. D. M. Moore, Univ. of Arkansas.

Oct. 17. *C. Ashei* from H. M. Sears, Sumter Nat'l. Forest, Columbia, S. C.

Oct. 20. *C. dentata* from Highland Lake, Pa., from Miss Margaret Lundy, Montoursville, Pa.

Oct. 21. *C. ozarkensis* from U. S. Forest Service, Russelville, Ark., through H. R. Koen, Forest Supervisor.

Oct. 21. *C. dentata* from Hot Springs, N. C., from J. Stuart Thomson, Glen Rock, N. J.

Oct. 23. *C. dentata* from roadside stand in New Jersey; said to come from native trees in Va.; through Miss Maud H. Purdy.

Oct. 29. *C. dentata* from Asheville, N. C., through J. Stuart Thomson, Glen Rock, N. J.

Nov. 8. *C. mollissima* from Mr. L. N. Senor, Medford, L. I., from U. S. D. A. trees shipped in 1926.

Nov. 22. *C. mollissima* (from Hupeh) } From Lu-Shan Arboretum and Botanical Garden at Han-Po-Kou, Lu-Shan, Kiukiang, China; through Mr. R. C. Ching.
C. Henryi } from vicinity
C. Seguinii } of Garden

Systematic Botany

The Classification of Dicotyledons

By Alfred Gundersen

The study of flower structures and flower buds has been continued with carefully made drawings by Miss Purdy. I have given special attention to flowers with parietal placentation and groups suspected of being related to them. I have given less attention to *Sympetalae*. Numerous additional cases where axile placentation is clearly preceded in the bud by parietal placentation have been found. In the older systems, including Jussieu, Bentham and Hooker, and Eichler, the two chief groups of parietal placentation represented by *Papaver* and *Cistus* were placed together. This is followed also in the more recent systems by Wettstein, by Warming, and by Rendle. In the Engler system, alone, *Cistus* and its relatives were moved to a higher place to be near *Cactus* and *Myrtus*. However, these genera may all belong together nearer the beginning; and thus at the same time flowers with parietal placentation come clearly before those with axile placentation. Further, such a position suggests that Australian plants, e.g. *Eucalyptus,* may be rather primitive forms of Angiosperms. The Dicotyledons (*Sympetalae* excepted) include about two hundred families. Their changing arrangement through half

a century is suggested by the lists on page 77, showing eighteen genera in seven systems.

In the *Sympetalae* parietal placentation is the exception, but is the rule in *Gentianaceae*. *Exacum affine* of this family, in flower in our conservatories, gave an opportunity to examine the bud which shows parietal placentation; it is axile in the adult.

Through the courtesy of Miss Harlow, of the New York Botanical Garden, I was enabled to examine for some time Payer's Organogenie de la fleur, Paris 1857. From his figures it is evident he observed nearly eighty years ago that parietal placentation usually precedes axile placentation in the flower bud. It is of interest that Hutchinson in the classification of Monocotyledons begins with those having parietal placentation.

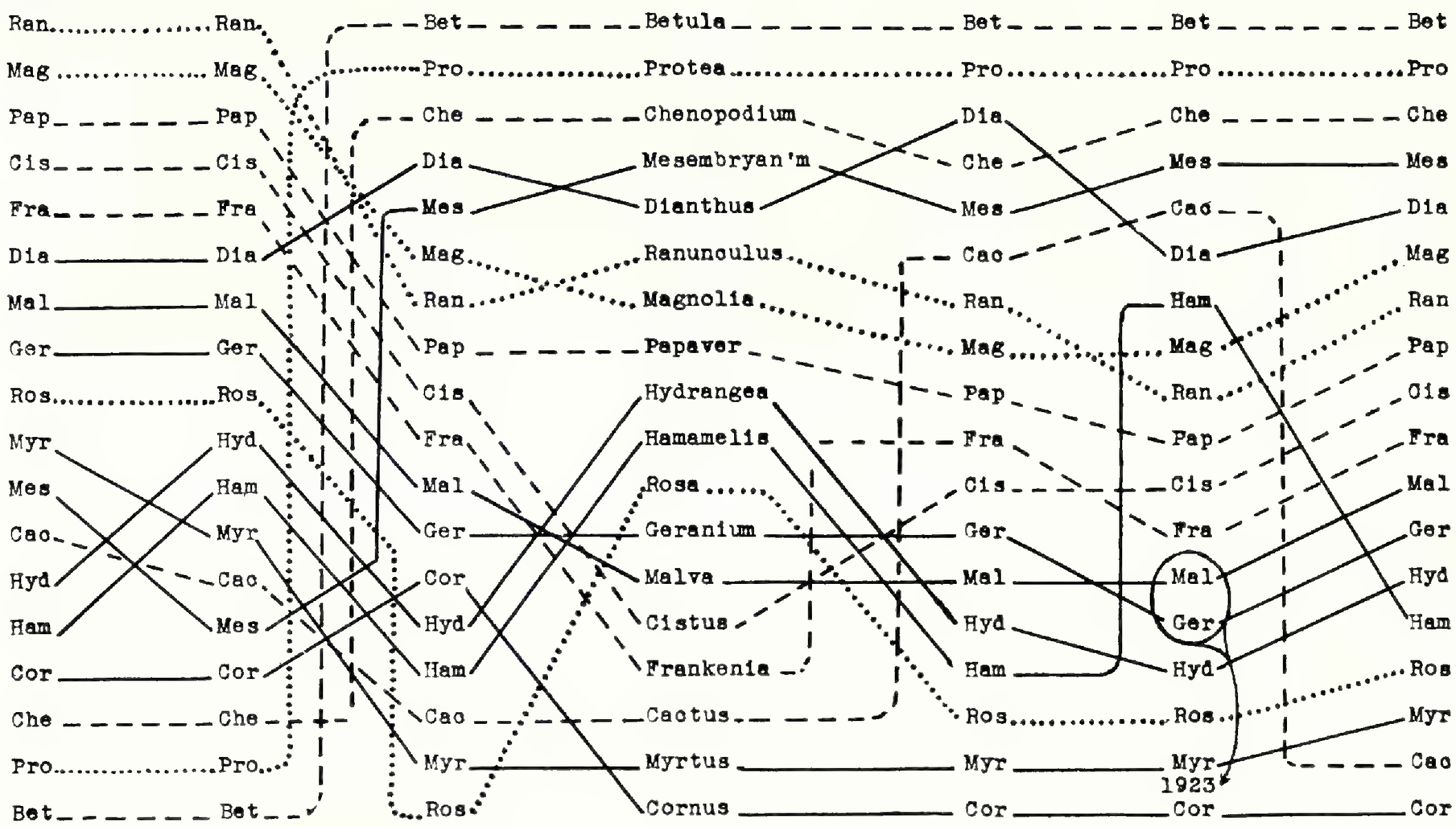
Systematic Botany

By Henry K. Svenson

The report on phanerogamic plants of the Astor Expedition was published in February (see list of publications, p. 153); the treatment of ferns, which is almost as extensive, is nearly complete as to manuscript, and the plates for illustration are fully drawn. In this paper I shall take up the relationship of the fern flora of the Galapagos Islands to that of the South American mainland with more detail than was possible with the heterogeneous groups of seed plants.

Another installment of the genus *Eleocharis*, covering all North American and West Indian species in groups not previously treated (with the exception of the *E. palustris* group), is almost complete. As in all extensive groups, the work of description is much more tedious and difficult than one bargains for at the beginning, but the interesting generalizations to be derived on the subject of plant geography and the relationship of species, make the labor well worth while.

Work on plants of the local region has been continued, embodied to some extent in the paper on the vegetation of the tidal shores of the Hudson River. A large part of my time during the winter has been occupied with identifications and studies on the plants recently collected by me in the southern states.



.....carpels separate or single, ___placentation parietal or basal, ——placentation axile or central

FIG. 7. One hundred years of Classification of Dicotyledons (Sympetalae excepted).

Coffee and Tobacco Pharmacology

By Ralph H. Cheney

The study of the molds which grow on coffee beans and also upon commercial coffee essences was continued. Further work was conducted regarding the formation and content of the coffee leaf glands. During the summer months of 1935 an experimental study was made of the effect of the coffee (*Coffea arabica* L.) seed alkaloid, caffeine; and, of the tobacco (*Nicotiana tabacum* L.) leaf alkaloid, nicotine, upon the action of the smooth muscle of the intestine. This research was begun at the Marine Biological Laboratory, Woods Hole, Massachusetts.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1935

Dr. C. Stuart Gager, Director:

Sir: I submit herewith my report for the year ending December 31, 1935.

Garden Attendance

We take, naturally, a great deal of satisfaction in reviewing the large increase in attendance during the past year. This has been manifested not only in the much larger number of people visiting the grounds and conservatories, but in the increased attendance in the classes of instruction, both for children and for adults.

Grounds.—The total attendance on the grounds, as recorded by the turnstiles at the five entrance gates, was 1,624,865, a new yearly record. The 1934 attendance, also the largest on record up to that time, was 1,352,407. The 1935 figure exceeded this by 272,458, an increase of slightly over 20 per cent. The attendance during seven particular months much exceeded all previous records for the same months, as follows:

	1935	1934	Highest previous record
March	118,914	79,107	101,434 (1929)
May	277,335	221,780	232,737 (1932)
June	182,916	140,078	181,887 (1933)
July	169,147	112,855	130,053 (1932)
August	151,038	116,010	116,010 (1934)
Sept	154,022	123,916	123,916 (1934)
Oct	145,942	126,176	126,176 (1934)

The largest attendance ever recorded for any month in the history of the Garden was that for May, 1935, *i.e.* 277,335, which is not very far from the *total attendance for the entire year of 1916,* (314,990) when attendance records began to be kept. The fact that the celebration of the 25th anniversary of the founding of the Garden occurred during this month may be responsible for some of the increase, but this does not explain the sustained record attendance extending even into the month of October. It seems reasonable to assume, however, that the publicity resulting from the commemoration exercises carried over beyond the month of May. We must not, however, overlook other important factors, namely the increased attractiveness of the Garden from both aesthetic and scientific standpoints. Rare species of exotic trees and shrubs, of inestimable value to those who are pursuing studies along these lines, are increasing in size and number year by year; the special gardens, such as the Japanese Garden, the Rose Garden, Iris Garden, Rock Garden, Children's Garden, Wild Flower Garden, etc., are gaining in popularity with each successive year; scenic and architectural features such as the Overlook, the Laboratory Plaza, the Boulder Bridges, the new Horticultural Section, the Wall Garden, etc., are attracting wide attention and interest.

An important element in the increased attendance is the great popularity of the floral displays which are ornamental features of the plantations. The more important of these, with the approximate dates when the flowers are at their best, are as follows:

Crocuses—March 20–April 7
Daffodils and Magnolias—April 7–April 21
Rock Garden flowers—middle of April and during month of May
Japanese Cherries—first week in May
Japanese Azaleas—about May 10
Wild Flower Garden—months of May, June, and September
Ghent Azaleas and Tulips—May 15–June 1
Bearded Iris—about May 24
Rhododendrons—June 1–15
Rose Garden—months of June and October
Mountain Laurel—about June 10
Water Lilies in Conservatory Plaza—July 1–October 15

East Indian Lotus in Japanese Garden—August 1–Sept. 7
Cannas and Dahlias—Sept. 15 and month of October
Chrysanthemums—October 15–Nov. 10

Week-end Attendance.—It is of course natural to expect that more people will visit the Garden during Saturdays and Sundays than at any other time during the week. We have had some large week-end attendances in past years, but never any that even approached the figure of May 11–12. We quote from a news release sent out to the metropolitan papers at that time: "During the week-end May 11 and 12, the turnstiles registered more than 43,000 people (43,416), which was [also] a record week-end. The city of Poughkeepsie, according to the 1930 census, had 40,288 inhabitants; and yet more people than live in a city of this size visited the Garden at this particular week-end." The largest previous week-end attendance was in April, 1933—29,062.

Conservatories.—The attendance at the Conservatories was an all-time high record—154,659—exceeding the record of 1933 (139,544) by more than ten per cent (for 1934 the attendance was 134,252); but in no single month did the record quite equal that of April, 1934—30,262. The nearest figure was that for June, 1935—29,468—which, nevertheless, gives an average of nearly 1,000 persons a day.

Attendance at Classes and Lectures.—The combined attendance at classes and lectures was the largest recorded in the history of the Garden—156,198, as against 139,370 for 1934, and 126,934 for 1933.

ATTENDANCE AT THE GARDEN DURING 1935

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes.....	557	1,659	2,438	3,600	3,184	4,445	20,790
At visiting classes....	1,387	720	9,903	6,990	13,150	2,600	50
At lectures to children	1,087	500	3,491	5,402	9,950	2,230	25
At lectures to adults..	15	200	80	169	7,390	200	0
At conservatories.....	5,901	6,416	14,038	23,952	29,468	17,248	9,391
At grounds.....	49,010	57,134	118,914	193,232	277,335	182,916	169,147

ATTENDANCE AT THE GARDEN DURING 1935

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
At regular classes.....	18,375	3,364	1,831	3,029	2,641	65,913
At visiting classes....	120	540	7,319	5,131	1,360	49,270
At lectures to children	40	140	5,157	3,001	905	31,928
At lectures to adults..	18	0	505	45	465	9,087
At conservatories.....	12,034	13,372	11,622	6,277	4,940	154,659
At grounds.....	151,038	154,022	145,942	79,517	46,658	1,624,865

School Supply Service

During the first half of the year, Miss Julia E. Best continued to act as School Service Assistant, supplying study material to the high schools, junior high schools, and colleges on the same terms as in the previous year: she served on the committee to prepare a school service exhibit for the twenty-fifth anniversary celebration in May. Miss Best resigned August 12. Beginning with the opening of the schools in September, Miss Marion L. Meurlin (A.B. Barnard College) was appointed in her place.

As shown by the following table, there has been some increase over 1934 in the number of requests for all material and in the number of Petri dishes filled with sterile agar; but neither figure has approached that of recent years when no charge was made. It will be recalled that in 1933, on account of the rapidly increasing demand which was beyond our capacity to supply, we were forced to make a nominal charge for material supplied to schools.

	1932	1933	1934	1935
Requests for the year (all material).....	398	421	247	278
Requests January to August.....	215	238	126	150
Requests September to December.....	183	183	121	128
Petri dishes filled during the year.....	5727	4888	1154	1409
Petri dishes filled Jan.–Aug.....	3664	4265	964	1065
Petri dishes filled Sept.–Dec.....	2063	623	190	344

STATISTICS OF SCHOOL SERVICE

	1935	1934
Loan Lectures (Lantern Slides, etc.)		
No. of sets lent	421	39
No. of teachers involved	556	249
No. of pupils attending	21,465	13,573
Material Supplied		
Total number of requests from schools	1,047	474
Number of different institutions	297	204
High Schools and H. S. Annexes		
Brooklyn (Total No. 40)	22	21
Queens (Total No. 23)	8	7
Manhattan (Total No. 34)	9	8
Other Boroughs (Total No. 22)	5	6
Junior High Schools (Total in Brooklyn 25)	23	12
Colleges and Universities (Total in Brooklyn 7)	8	6
Elementary		
Brooklyn (Total No. 223)	108	84
Queens (Total No. 162)	42	4
Manhattan (Total No. 132)	2	2
Other Boroughs (Total No. 149)	3	3
Private and Parochial	27	24
Other Institutions	40	27
Number of potted plants for nature study	3,474	3,768
Number of Petri dishes filled with sterilized agar	1,409	1,154
Total number of teachers supplied with material	10,891	4,733
Total number of pupils reached	470,855	238,916
Living Plants Placed in School Rooms		
No. of schools	66	24
No. of plants	423	181
No. of teachers involved	542	221
No. of pupils reached	21,364	7,550
Plants Distributed (Raised in Classes)	29,454	28,479
No. of persons taking plants	1,508	1,297
Total number of schools represented	137	153
Seed Packets for Children		
No. of schools	497	581
No. of teachers	8,334	7,094
No. of pupils	333,361	283,732
No. of packets	1,000,084	851,115
Exhibits Provided		
No. of exhibits	19	22
Viewed by	120,740	93,730

Adult Courses

Total Registration.—A total of 907 adults registered in all our courses during the year. If we add to this 40 students who registered for the special course (C9) "Nature Study for Boy Scouts, Girl Scouts, Camp Fire Girls, Scout Leaders, and Others," the total would amount to somewhat more than that of 1934; but about half of those who took C9 can not be classed as "adults." With the omission of this course, then, the figures for the last seven years stand as follows:

Year	*Persons Registered*
1929	764
1930	802
1931	823
1932	908
1933	823
1934	927
1935	907

Courses Conducted by This Department.—Miss Rusk continued with her courses in General Botany (B1), and Field and Laboratory Study of Flowering Plants (B10). Miss Rusk also gave, both in spring and fall, outdoor courses on the Flowering Plants and Ferns of the New York Region, with a total registration of 51 persons. Miss Vilkomerson and I gave the course in Trees and Shrubs of Greater New York as usual, with a registration of 58 persons in the spring and 49 in the fall. I have given this course now for thirteen successive years, with a total registration of 1,105 persons. Regarding the course for nurses-in-training, we have received so many inquiries about the nature of this work that I am describing it in some detail, in the next section (p. 85).

New Courses.—In the course entitled "Greenhouse Gardening" (A35), conducted by Miss Shaw, Mr. Free, and Miss Dorward, and open to those who had already taken the course in Fundamentals of Gardening (A25), 25 persons were registered. The course in Economic Plants (B15–16), conducted by Dr. Cheney, was given for the first time this year, commencing in September. The course C9, referred to above, although it has been offered in

FIG. 8. Daffodils (Sir Watkin), on Boulder Hill. April 27. (5775)

the Prospectus from year to year, had not been given for many years. Upon request of the sponsors of the "University of Boyology," organized under the sponsorship of the Boys Welfare Foundation of Brooklyn, we gave a course in "nature study"—consisting for the most part of the characteristics of the different kinds of woody plants in the Garden, but including in addition some birds, the glacial features of the Garden, labelled boulders, the armillary sphere, meridian panel, etc. About half of those who enrolled were boy scouts—the rest being scout leaders. Five exercises were held, all in the Botanic Garden, on Saturday afternoons, beginning March 23. I gave the first 3 exercises: the last two—April 13 and 27—were conducted by Miss Hammond and Mr. Doney, respectively, because the times conflicted with our regular Saturday afternoon class in Trees and Shrubs (A9 and B13–14).

Course for Student Nurses

The course for nurses-in-training was given as usual in the spring and fall—10 exercises of 2¼ hours each for each term. The young women came as usual from three hospitals: Kings County, Prospect Heights, and St. Johns—39 students in all in the spring and 84 in the fall. This course was first given in the spring of 1927 at the suggestion of Miss Margaret S. Belyea, then director of nursing at the Prospect Heights Hospital, but now at Shepherd Pratt Hospital, Towson, Maryland, and Miss Mary E. Corcoran, then instructor of nurses at the same institution, but now of Greystone, N. J. The course has now been given, therefore, for nine consecutive years, and has been described, as a novel educational experiment, in the *American Journal of Nursing*. Originally a course in elementary botany with regular field trips each week, it has become more and more adapted each year to meet the special needs of the students. As now conducted, more than 50 medicinal plants are studied in the living condition on the grounds or in the conservatories; and in the laboratory those subjects are studied which are related in some way to *materia medica*, to dietetics, or to diseases. Incidentally, the interconnections and interrelationships of the plant and animal kingdoms are discussed.

Following is a general outline of the course as at present given.

I. Laboratory Study (with compound microscope)

1. Study of plant cell. (Using *Spirogyra,* a simple green alga.)
2. Lecture on plant cell and functions of its parts. Comparison with animal cells.
3. Study of leaf structure. (Using fresh cross sections of rose leaf.)
4. Study of sections of potato tubers and of starch grains.
5. Lecture on nature of color, photosynthesis, starch formation; demonstration, by experiment, of need of light for photosynthesis. Comparison of nutrition of animals and green plants. Respiration. Nature and composition of ordinary air.
6. Study of bacteria from teeth, and of pathogenic bacteria from prepared slides. Review quiz on work to date.
7. Lecture on bacteria. Laboratory study of yeast plant.
8. Lecture on yeast, distillation, and distilled liquors. Laboratory study of seeds of bean and grain of corn; in particular their stored food.
9. Study of *Cinchona* plant (the source of quinine), and lecture on malarial parasite (*Plasmodium malariae*).
10. Final tests. Identification of medicinal plants on grounds and in conservatories: written test on laboratory work and lectures.

II. Field Work

About half of each session is devoted to the study of the medicinal plants growing on the grounds and in the conservatories; and, in addition, the study of common garden flowers, and of the various gardens, including the Japanese Garden, Rose Garden, Rock Garden, Wild Flower Garden, Children's Garden, etc. During the field trips, also, various ornamental and scientific features of the Garden, such as the armillary sphere, the meridian panel, glacial boulders, etc. are explained and discussed. At the final field test last fall the following plants were identified by the students:

1. *Ephedra distachya*—Ephedra—Mydriatic
2. *Thuja occidentalis*—Arbor-vitae—Diuretic
3. *Juniperus communis*—Juniper—Diuretic

4. *Prunus serotina*—Wild Black Cherry—Expectorant
5. *Convallaria majalis*—Lily-of-the-valley—Cardiac remedy
6. *Humulus Lupulus*—Hops—Calmative, tonic
7. *Ficus carica*—Fig—Laxative
8. *Sassafras officinale*—Sassafras—Flavoring
9. *Hamamelis virginiana*—Witch Hazel—Astringent, haemostatic
10. *Salix*—Willow—Antirheumatic
11. *Thymus serpyllum*—Thyme—Antispasmodic
12. *Chrysanthemum* *
13. *Glycyrrhiza glabra*—Licorice—Laxative
14. *Coffea*—Coffee—Cerebral stimulant
15. *Thea sinensis*—Tea—Cerebral stimulant
16. *Erythroxylon Coca*—Cocaine—Local anaesthetic

—Optional—*Aloe vera*—Aloes—Cathartic

In this examination the class was conducted to each plant on the ground, and every student was requested to write the botanical name of the plant in question and its chief medicinal use. Nineteen of the students received a mark of 100 per cent. in this part of the work. Finally, the care of plants in the sickroom was discussed (using a Botanic Garden *Leaflet* on the care of cut flowers, which I have prepared), and also the history of the development of the use of plants in medicine, including the "doctrine of signatures." For the illustration of both these subjects, rare editions among our incunabula and other books in the library are invaluable aids.

Flower Days

In connection with the exercises in commemoration of the 25th anniversary of the founding of the Garden, from Monday, May 13 to Thursday, May 16, inclusive, a large number of public meetings were held to which all members of the Garden received invitations; and at occasional intervals between lectures visitors were invited to see the plantations under guidance.

On account of these opportunities for inspection, the usual Flower Days were omitted, except that two lectures and inspections of the Rose Garden were held, as follows:

* The names of common garden plants are also required of the students.

Tuesday, June 11. Eighth Annual Rose Garden Day. *Leader:* Mr. Charles H. Totty, of Madison, N. J., member and consulting rosarian of the American Rose Society. *Topic:* How to grow roses.

Tuesday, October 8. Fall Rose Garden Day. *Leader:* Mr. Montague Free. *Topic:* Rose culture under city conditions.

About 200 people came to each of these Flower Days.

Cooperation with the Department of Botany of the Department of Education, Brooklyn Institute of Arts and Sciences

Continuing this cooperation along the line of the program in 1934, round table discussions were held at the Brooklyn Botanic Garden, the dates, leaders, and subjects being as follows:

January 9. *Plant and Animal Evolution: their Interdependence.* Dr. Alfred Gundersen, Curator of Plants. This talk was illustrated by Miss Maud H. Purdy, who made appropriate drawings in color while the lecture was being given.
February 13. *Breeding and Inheritance in Plants.* Dr. G. M. Reed, Curator of Plant Pathology.
March 13. *Grasses.* Mr. Charles Ericson.
April 10. *Botany for the Urban Amateur.* Miss Grace Petersen.
November 6. *Immigration of Plants.* Mrs. Mary Holtzoff.
December 4. *Seaweeds.* Mr. Charles Ericson.

At the Annual Social of the Department, which occurred on Wednesday, October 9, held as usual at the Brooklyn Botanic Garden, I gave an illustrated talk on European parks and botanic gardens. The custom of holding this Annual Social at the Brooklyn Botanic Garden in October commenced in 1921, and has continued without interruption ever since.

Editorial Work and Publicity

As usual, I continued to serve on the board of editors of the *American Journal of Botany,* as editor of the Plant Section of General Biology for *Biological Abstracts,* as editor of the *Brooklyn Botanic Garden Contributions,* and, until March, as associate editor of the *Bulletin of the Torrey Botanical Club.* I prepared

an article on Botany for the year 1934 for the annual revision service of *Collier's National Encyclopedia.* I continued as editor of the *Brooklyn Botanic Garden Leaflets,* and report that six numbers were issued during 1935. During the year, thirty-three news releases, containing thirty-six articles relating to Garden events, were prepared and sent out to the principal metropolitan newspapers. A total of 1,178 press clippings were received, as against 1,472 during 1934.

Exhibits

At the Commemoration Exercises.—For the celebration of the 25th anniversary of the founding of the Garden, May 13–16, an exhibit was prepared, under the title of "Making a new chestnut tree." Photographs of the plantation at Hamden, Connecticut, of hybrids, and of the Japanese trees on Long Island used as the Japanese parents of our original hybrids were displayed, as well as photos of former vigorous American trees, and a diagram explaining the development of young, apparently healthy shoots from the base of dead trunks; also, potted specimens of exotic species of chestnuts and a young tree of American chestnut nine years old and still living though attacked by the fungus (*Endothia parasitica*) at its base. This tree was brought for the purpose from the plantation at Hamden. A Riker mount showing the fungus in the bark and explaining its reproductive methods was also shown.

For the educational exhibit at this celebration, Miss Best assembled specimens of study material which the Garden distributes to schools.

At Columbia University College of Pharmacy.—For the exhibit of "Drug Botany" held May 24–25 and May 31–June 1, we supplied the following plants:

Potted plants: Marrubium vulgare, Mentha piperita, Lycopersicum esculentum, Erythroxylon Coca, Mimosa pudica, Urginea maritima, Aloe verascens, Convallaria majalis.

Cut specimens: Adonis sp., *Delphinium* sp., *Ficus carica, Coffea arabica, Sassafras variifolium, Prunus avium, Rhamnus cathartica, Hamamelis virginiana, Vanilla planifolia, Amomum Cardamon, Cinnamomum Camphora, Pinus Strobus, Matricaria, Tanacetum*

vulgare, Aconitum Napellus, Nepeta Cataria, Datura Stramonium.
Uprooted plant: Glycyrrhiza glabra.

Miscellaneous Items

Docentry and Visiting Classes.—During the year, groups representing various organizations, as well as classes from high schools and colleges, have been conducted through the grounds and conservatories by members of this department and others. Some of the classes were from Hunter College, Drew University, N. Y. School of Fine and Industrial Arts, Grover Cleveland H. S., St. Barbara H. S., Girls Commercial H. S. For the last named a special trip for the study and review of the subjects of vegetative reproduction and plant propagation was given. A mimeographed outline prepared especially for the trip was given to each of the 135 students.

Largest Oak on Long Island.—On May 23, at the request of Mrs. F. Raymond Lefferts of Manhattan and Setauket, we visited the famous old oak at Stony Brook, and gave recommendations for treatment to prolong its life. The tree measured 19 feet 7 inches in circumference, five feet from the ground, in 1922,[1] and presumably is now somewhat larger. It was badly in need of pruning, and had developed cavities near the base of the trunk; but, barring unforeseen circumstances such as lightning stroke and violent windstorms, it should last many years longer.

Rare Woods sent to Yale.—On May 4 we sent to Prof. S. J. Record, of the Yale School of Forestry, New Haven, a section of the trunk of a European silver linden, *Tilia tomentosa,* which was being removed from our Wild Flower Garden; also sections of *Deutzia Vilmorinae* (China) and *Viburnum rhytidophyllum* (Western China) which were being cut out because of winter injury.

Boy Scout Work.—I have continued to act as councilor in Botany, Conservation, and Forestry for the Brooklyn Boy Scout organization. On Saturday, October 5, I held an examination for merit badges. For the ensuing year I have been appointed councilor for the Stuyford Assembly (*i.e.* covering Stuyvesant and Bedford districts).

[1] Taylor, Norman. The forests and some big trees of Long Island. Brooklyn Bot. Gard. *Leaflets* 10[8]. 1922.

Postcard Bulletins were sent to members in February, telling of nursery and seed catalogs for the new year on file in the Library, and on June 6 telling of special arrangements to keep the Rose Garden open for members until 7 p.m. each day from June 10 to June 28 inclusive, except on Saturdays and Sundays.

New York Biology Teachers Association Fall Outing.—At the request of the committee of this organization, I acted as guide for one of the field trips. The meeting was held at the biological stations at Cold Spring Harbor, September 21.

Bureau of Information.—We have, as usual, answered many questions relating to plants. The answers have been given usually by mail or by telephone. In a few cases we have made personal visits.

Radio Talks during 1935.—During the year I gave six broadcasts on subjects relating to the Garden, from the Municipal Broadcasting Station, WNYC, Manhattan.

Research Work.—An account of the year's work on breeding the chestnut will be found on pages 62–75 of this report.

Respectfully submitted,

ARTHUR HARMOUNT GRAVES,
Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1935

DR. C. STUART GAGER, DIRECTOR.

Sir: I hereby present the annual report of the Department of Elementary Instruction for the year 1935.

During the early part of the year much time was given up in conference preparatory to the celebration of our twenty-fifth anniversary. Miss Dorward took charge of an exhibit on all phases of our greenhouse work for children and adults; also an exhibit of departmental work staged in the children's clubroom and the adjacent corridor: Miss Hammond was chairman of school service work, and with the help of Miss Julia Best, placed it in Room 327: Miss Miner set up exhibits of the seed work in its own quarters, and garden work in the children's garden house. The

children's outdoor garden was an exhibit in itself. Twenty boys and girls were used to demonstrate our methods of work. About 300 visitors saw the garden in full swing, and great interest was shown.

There has been an increase in our penny-packet seed work. Over a million packets were distributed. This, of course, represents an enormous amount of work throughout the year, and in this work the people assigned to my Department by the WPA (Federal Works Progress Administration) have been of real assistance.

The class in Fundamentals of Gardening was held, as has been done for some years past, and another course, Greenhouse Gardening, was given for those who had been in Fundamentals of Gardening and desired to have more practice in greenhouse work.

For several years we have been emphasizing in the work for our public and private schools a "series-plan" of lessons in school and after school time. Schools availing themselves of this plan were the following:

Abraham Lincoln High School
Girls' Commercial High School
Adelphi Academy
Berkeley Institute
Brooklyn Ethical Culture School
Packer Collegiate Institute
Wilde Open Air School
P. S. 42
P. S. 72

On January 26 the children's "special honor classes" began their work. A group of five boys continued their study with the microscope with Miss Best. Miss Dorward took up, with some of the older girls, the subject of economic plants, their growth and use; Miss Miner had a group of boys and girls who made plans for the annual border and started plants for the Shakespeare garden and the annual border.

Miss Hammond, with a selected group of boys and girls, revised the book of Flower Games. New games were added, some improvements made in the old ones, while one or two, which the children found uninteresting, were dropped. New pictures were put in and the whole was reprinted. The money for this was a gift of last year from the Woman's Auxiliary.

The regular children's Saturday morning classes were started

on March 16 with a registration of 210. This work was based on preparation for the outdoor garden.

The outdoor garden was started earlier in order that it should be in good condition for the anniversary. The weather was favorable so that "Planting Days" were held on April 27 and May 4, about two weeks earlier than usual. A group of the older boys and girls had started all the seedlings for the flower border so that when planting time came there was a total of about 4,000 seedlings already pricked out for this border. The border itself was planned in relation to color, relative height, and cultural directions. A final plan was made by Howard Garabrant.

Our garden was a much more successful one this year than last (from the standpoint of crop), doubtless due largely to the fact that during the fall of 1934 Mr. Free had it plowed to a depth of ten inches. One hundred bales of peat moss were applied to the north section of the area, and several loads of manure to the south section. During the week before Easter (April 21), lime was spread over the peat, and the whole garden was plowed again and harrowed. Commercial fertilizer, Red Seal, was applied to the north section, 20 lbs. per 1,000 square feet, and the garden was harrowed again before it was laid out and the paths made. A second application of the commercial fertilizer was made by the children about the middle of June.

An experiment was tried this year in "community gardening." Sixteen of the larger plots were all thrown together with no intermediate paths so that an area 82½ ft. by 22½ ft. was obtained. Eighteen boys and girls cultivated this. We have tried this before, and have now come to the conclusion that, for us, the regular individual plot is more successful.

Two hundred and ten children registered for plots and planted them in April. A new method was tried this year in regard to taking in new children. There were thirty-two boys and girls who were placed on a selected waiting list. These children came to the Garden in the springtime and met the Curator personally. On July 8 this group was admitted to the outdoor garden. They all worked in one unit so that they received the same attention that the other children had received when the garden was started in the spring. The plan worked well because the children started in as a part of our original plan, and did not come in one by one.

FIG. 9. Saturday morning in mid-winter. Playing a "Flower Game." (8718)

Certain gardens in the larger section and portions of the border were set aside for silver pin work. I am often asked about the requirements for bronze and silver pins, and bronze and silver medals. In early years we used to give a certificate to each child completing a course. By a course we mean a series of lessons forming a complete unit, such as the series beginning in the fall and ending at Christmas time; or beginning in the spring and ending just before the period of the outdoor garden. In each series we have a number of courses conducted simultaneously. In order to reduce the amount of matter in the Prospectus of 1935–36, I stated on pp. 208–9 that our work was divided into four series, fall, winter, spring, and summer. This was somewhat misunderstood since it was interpreted as a course meaning just one class per Saturday. Since 190 children registered, it should have been plain that this figure represented registration in a number of classes. This particular year the 200 children were divided into six classes, which, by simple arithmetic, means about thirty children to a group. In spite of the arithmetic, it does not work this way. For example, this fall, forty children about eight years old were in one group—far too many for the work we plan to do. The original program of 1913–14 was arranged for groups of not more than twenty-four children to the group in order that the individual could receive the benefit of personal attention and aid. When the numbers increase without the number of instructors increasing, a part of the value of the work is lost.

After a child has finished three of these courses he is entitled to a bronze pin. For this he pays fifteen cents. The bronze pin marks the completion of three courses. A bronze medal is given for good work in the outdoor garden. The winner must be at least ten years of age and have done good work in the garden and acquired a certain amount of information on common flowers, vegetables, and other nature subjects. He must have given during those years some time in useful help to the garden. This takes the form of filling penny packets of seed, of helping weed the borders which are held in common with other children, and if he be an older child, assisting with the little children.

After the bronze medal has been won (and it is to be noted here that there is no competition in this work except competition with

one's self) he is eligible to work for a silver pin. This represents special work on a subject in the plant world. The following shows the list of subjects covered during this last year.

A Southern Garden
A Study of Weeds
Some Unusual Vegetables
Hybridizing Corn
The Rose Garden
The Potato
A Flower Garden
Tea
Plant Propagation by Cuttings
Cocoa

After the silver pin has been awarded (this, too, is presented to the child and not paid for), he may work for his silver medal in the outdoor garden on somewhat the same terms as he works for his bronze medal. A goodly amount of service is required for this. The older boys and girls, usually high school students, representing about one-third of the registration, band themselves into junior assistants and are of great help not only in the outdoor summer garden, but in the indoor work.

There are some cups, too, for older boys and girls, such as the Butler Cup presented by Mrs. Glentworth R. Butler to a girl; the Graduates' Cup which is usually given to a boy; and the Bernard Goodman Cup awarded to a boy. Two gold Honor Pins are given by the Curator for special services. While these prizes represent a certain amount of competition, we so arrange it that the competition does not appear in the foreground, and is of practically no moment.

This year we changed some of our requirements so that boys and girls who go away for the summer have an opportunity to earn their bronze and silver medals which heretofore have been awarded for work done in our own garden only. In the first year of the children's garden, 1914, there was practically no change in registration throughout the summer. This carried on until after the war, when many people started sending their children to summer camps, and taking them away to the country or seashore. This is now a permanent factor in the consideration of taking children into the garden. In order that children who have shown ability shall not be barred out of the garden we plan for a regular turn-over after July 1.

On October 26 registration for the fall classes took place. One hundred eighty-five children registered. The work was somewhat

more varied than in the spring. All the classes made bayberry candles for Christmas, and, with the exception of the little girls who made Christmas cards with plant designs, they did some work in the greenhouses. Thirty-two of the younger girls had special nature work with Miss Hammond and set up two bird-feeding stations for Thanksgiving and trimmed a Christmas tree with suet and other food for the birds.

Miss Michalena Carroll gave a course of six art lessons to Miss Hammond's group of girls, with designs based upon plant life. The fall work ended with the annual Christmas party in the children's clubroom, at which each child received a Christmas plant.

So much interest in junior garden work was shown during Flower Show week—an interest which has been building up throughout the last few years—that a conference was held here at the Garden for those concerned in that work. There was a good response to this, and throughout the year many requests have come in for assistance in this particular side of work. In fact, the number of people reached through conferences has greatly increased so that nearly 100,000 people were assisted in various ways through this one avenue alone.

Another increase in our work has come through the distribution of plants raised in our own Botanic Garden classes. By an occasional visit to these three very much overcrowded instructional greenhouses of ours, one cannot realize the output. About 30,000 plants went out from the regular classwork alone; which figure does not include the plants raised by the children for their gardens.

The amount of nature material sent to institutions of all sorts is rapidly increasing. Last summer one of the older boys spent two days a week in the country collecting nature material, and Miss Hammond spent a part of the summer and some time during the fall on this work.

Such letters as the following tell their own story.

"Straubenmuller Textile High School,
New York, N. Y.,
December 20, 1935.

". . . Today we are returning the exhibit of house plants which you were good enough to lend our school for Science Week. The show and other events have been a great success and we greatly appreciate your part in it."

"Brooklyn Recreation Center,
Works Division, Emergency Relief Bureau,
Brooklyn, N. Y.,
June 6, 1935.

". . . Please accept my sincerest thanks for the one hundred packages of seeds you so generously contributed to our program.

"Needless to say, these seeds will be distributed among our play areas where the children who attend them will be encouraged to cultivate their own gardens."

There have been no great changes in personnel this year. The Assistant Curator of Elementary Instruction was granted a year's leave of absence for study in England. Miss Dorward left the Garden in August and started her work in September at The Horticultural College for Women, at Swanley, England, under the directorship of Dr. Kate Barratt, who visited us during our twenty-fifth anniversary and spoke at the horticultural session. Miss Dorward's position is left unfilled for the year. Extra assistance was needed, however, and Miss Beatrice Clark, Wellesley 1935, was appointed, and also Miss Mary McArdle, a former student, for part time work.

I spent the summer in Europe visiting famous gardens, and since I was to be abroad, offered to attend the International Botanical Congress in Amsterdam to represent the Garden since no delegate could be sent by the Garden. This offer was accepted and I spent the first week in September attending the meetings.

I still act as Honorary Secretary of the National Plant, Flower and Fruit Guild, and serve on the Central Borough Committee, Brooklyn Girls' Work Council, and as a member of Tufts College Alumni Council. I am also Vice President of the New York Chapter of The American Nature Study Society. I have written the usual weekly articles (37 in all) for The New York *Sun*, carried a heavy speaking program, and in November, at the request of the Board of Education of East Orange, New Jersey, inaugurated a series of monthly lecture-conferences for their teachers which will extend well into 1936.

Respectfully submitted,

ELLEN EDDY SHAW,
Curator of Elementary Instruction.

REPORT OF THE CURATOR OF PLANTS FOR 1935

DR. C. STUART GAGER, DIRECTOR.

Sir: Herewith I submit my report for the year ending December 31, 1935.

TREES AND SHRUBS

An inventory of the outdoor trees and shrubs now growing in the Garden, not including varieties, was made by Mr. Doney during the fall of 1935 with the following result:

Number of genera 326, number of species, 1,330.

The expansion and partial rearrangement of the nursery facilitates developing our collections. Nearly one hundred small plants of rare trees and shrubs were distributed to exchanging institutions. During the spring *Magnolia Kobus* flowered, and we had fruit of *Leitneria floridana* for the first time in our Garden. The Actinidias, which had partly grown together, were separated on the new pergola and will be named when they flower. Plans were made for planting horticultural varieties in the new Horticultural Section.

LILACS

In cooperation with Mr. Caparn, a new plan was made for the lilacs. It is not intended to move most of the old lilacs, but gradually, as replacements are made, to make them in accordance with the new plan. The lilac species, however, were planted in the fall in their assigned position at the south end of the lilac area. Nearly all our lilacs have now been given names, though in a number of cases the name is only tentative, awaiting further study. We have at the present time fifteen species of lilacs, eight forms of varieties of others than *vulgaris,* and 86 single and 73 double varieties of *vulgaris*. The list follows:

CLASSIFIED LIST OF LILACS (SYRINGA)

GROWING IN BROOKLYN BOTANIC GARDEN, 1935

1–3. Lilac Species

1. Japonica Group

amurensis	japonica	pekinensis

2. Vulgaris Group

Julianae	persica	velutina
microphylla	pubescens	vulgaris

3. Josikaea Group

Josikaea	Sweginzowii	villosa
reflexa	tomentella	yunnanensis

4. Lilac Varieties of Other Species than Vulgaris

Josikaea var. eximia	persica var. alba	Sweginzowii var. densiflora
Josikaea var. Zabel	reflexa var. Palibiniana	
oblata var. dilatata		
Palibiniana var. Excellency	Sweginzowii var. albida	

5–14. Varieties of Vulgaris

5. Lamartine Group

Berryer	Louvois	Turgot
Catinat	Necker	Vauban
Lamartine	Pascal	Villars

6–9. Other Single Varieties of Vulgaris

6. Vestale Group (White)

alba var. grandiflora	Marie Legraye
alba var. virginalis	Mont Blanc
Jan van Tol	Reine Elizabeth
Mme. F. Stepman	Vestale
Marie Finon	vulgaris var. alba

7. Reaumur Group (Dark Reddish)

Captaine Baltet	Louis van Houtte	Prince of Wales
Charles X	Ludwig Spaeth	Reaumur
chinensis rubra	Lutèce	Rochambeau
Dr. Lindley	Mme. F. Morel	Roi Albert
Gloire de Lorraine	Marceau	Rouge de Trianon
Hyazinthenflieder	Massena	rubra insignis
J. de Messemaker	Maurice Barres	Toussaint L'Ouverture
La Place	Mrs. W. E. Marshall	Turenne
Leon Mathieu	Negro	Vesuve
Leopold II	Pasteur	Ville de Troyes
L'Oncle Tom	President Massart	

8. Macrostachya Group (Pink)

Amethyst	Geant de Batailles	Marechal Foch
Captaine Perrault	Gloire de Moulins	Marengo
Chinensis	Herman Eilers	Mons. von Aerschot
Christophe Colomb	Hers var.	Old French
Danton	Hugo Koster	Old Huguenot
De Croncels	Lovaniensis	Philemon
De Louvain	Lucie Baltet	Virginité
Frau W. Pfitzer	Macrostachya	

9. Bleuatre Group (Bluish)

Amoena	De Miribel	Ronsard
Bleuatre	Fuerst Liechtenstein	Saturnale
Boule Azurée	Jacques Callot	True Blue
Cavour	Maurice Barres	
Decaisne	President Lincoln	

10–14. Double Varieties of Vulgaris

10. Edith Cavell Group (White)

Banquise	Jeanne d'Arc	Mireille
Dame Blanche	Mme. de Miller	Siebold
Edith Cavell	Mme. Kath. Bruchet	
Ellen Wilmott	Mme. Lemoine	

11. Chas. Joly Group (Dark Reddish)

Arthur Wm. Paul	Linné	Paul Thirion
Chas. Joly	Marechal de Bas-	Violetta
De Saussure	sompièrre	
La Tour d'Auvergne	Mrs. Edw. Harding	

12. Thunberg Group (Pink or Lavender, Large-Flowered)

Abel Carrière	Jules Ferry	Montaigne
Aucubifolia	Kath. Havemeyer	Monument Carnot
Charles Sargent	Lamarck	Paul Deschanel
Condorset	Lemoinei	President Fallières
Deuil d'Emile Gallé	Leon Gambetta	President Poincaré
General Pershing	Louis Henry	Thunberg
George Bellair	Mme. A. Büchner	Waldeck-Rousseau
Hippolyte Maringer	Marc Micheli	William Robinson
Jean Macé	Maximowicz	

13. Maxime Cornu Group (Pink or Lavender, Small-Flowered)

Comte de Kerchove	Jean Bart	Maxime Cornu
De Jussieu	La Mauve	Michel Buechner
Edouard André	Le Gaulois	Senateur Volland
Emile Lemoine	Le Notre	
Henri Martin	Leon Simon	

14. Emile Gentil Group (Bluish)

Desfontaines	Godron	President Grevy
Duc de Massa	Jules Simon	President Viger
Edmond About	Languis	Réné Jarry-Desloges
Emile Gentil	Marechal Lannes	Tournefort
General Kitchener	Naudin	

Evolution Exhibit

In connection with the Twenty-Fifth Anniversary the exhibit in conservatory no. 2, illustrating the evolution of plants, was improved. The central bench is now arranged in steps, representing Algae, Mosses, Clubmosses, Ferns, and Gymnosperms, with the two side benches for Flowering Plants, one for Dicotyledons, the other for Monocotyledons.

Iris and Narcissus

The report of Dr. George M. Reed, in charge of *Iris* collections, will be found in the statistical report attached hereto, page 103.

American Index of Cultivated Trees and Shrubs

This publication, with which I have been occupied for some years with Mr. Alfred Rehder, of the Arnold Arboretum, and Mr. Henry Teuscher, of the New York Botanical Garden, is almost ready for the printer.

Courses

Ten outdoor lessons on "Plant Families," dealing chiefly with the structure of flowers, were given during the spring. They were continued in the fall with eight lessons on fall flowers, leaves, and fruits, and concluded with two lectures on "Plant-Animal Interdependence in Evolution." A spring course of ten lessons on "Ornamental Shrubs" was given by Mr. Charles F. Doney.

Statistics will be found appended to this report.

Respectfully submitted,

Alfred Gundersen,
Curator of Plants.

Statistics Relating to Living Plants

	Species or Varieties	Plants
Living Plants Received:		
By collection	10	73
By exchange	174	1,558
By gift	423	1,422
By purchase	192	1,982
By seed	755	755
Total	1,554	5,790
Living Plants Distributed:		
To members		8,190
By gift		43
By exchange		7,119
Total		15,352

Bearded Iris

Received by Exchange:

Mrs. J. F. Emigholz, Kenwood Iris Gardens, Cincinnati, Ohio	7	varieties
Farr Nursery Company, Weiser Park, Pa.	7	"
Miss Harriette R. Halloway, Plainfield, N. J.	3	"
Mrs. Edward L. Kernochan, Colorado Springs, Col.	1	"
Mrs. L. W. Kellogg, Over-the-Garden-Wall, West Hartford, Conn.	21	"
Mrs. Thomas Nesmith, Fairmount Iris Gardens, Lowell, Mass.	23	"
New Jersey Agricultural Experiment Station	28	"
Mr. J. C. Nicholls, Jr., Frazer, Pa.	20	"
Mr. Robert Schreiner, Schreiner's Iris Gardens, St. Paul, Minn.	3	"
Mr. Robert Wayman, Bayside, L. I.	36	"
Mr. Howard Weed, Weed's National Iris Gardens, Beaverton, Ore.	10	"
Mr. Fred R. Whitney, Hudson Gardens, Germantown, N. Y.	3	"
Colonel W. J. Young, West Point, N. Y.	5	"
Total	167	varieties

Japanese Iris

Received by Exchange:

John Lewis Childs, Inc., Flowerfield, L. I.	25	varieties
Miss Edna L. Corrothers, Fairview, W. Va.	1	"
Mr. Howard Weed, Weed's National Iris Gardens, Beaverton, Ore.	10	"
Total	36	varieties

Miscellaneous Iris

Received by Exchange:

Mr. Joseph Aerts, Anderlecht, Belgium	3	species	(9 var.)
Mr. Alfred Bates, Newark, N. J.	2	"	
Dr. R. A. Harper, Ridgewood, N. J.	3	"	
Mrs. Edward L. Kernochan, Colorado Springs, Col.	2	"	
Mr. A. E. Kunze, Birmingham, Ala.	2	"	
Dr. Frank T. McFarland, Lexington, Ky.	1	"	
Mr. J. C. Nicholls, Jr., Frazer, Pa.	2	"	
Van Bourgondien Bros., Babylon, L. I.	2	"	(5 var.)
Mr. Robert Wayman, Bayside, L. I.	1	"	(6 ")
Total	18	species	

Narcissus

Received by Exchange:

A. Frylink & Sons, Inc., Babylon, L. I.	23	varieties

Labels and Signs

Labels and signs were made by Mr. John McCallum as follows:

Small galvanized iron labels for the herbaceous beds	294
Large galvanized iron labels for the herbaceous beds	161
Lead labels for the woody plants	67
Small wood labels	277
Wooden signs	31
Cardboard signs	778
Total	1,608

Also numerous miscellaneous numbers and signs.

REPORT OF THE CURATOR OF THE HERBARIUM FOR 1935

DR. C. STUART GAGER, DIRECTOR.

Sir: I submit herewith my report for the year ending December 31, 1935.

In addition to local collections made in the vicinity of New York during the spring, I spent two summer months in the southern states, obtaining seeds for the international seed exchange and specimens both for the herbarium and for exchange purposes. Despite the extremely hot weather, about 5,000 herbarium specimens were accumulated. Of the seeds and living plants collected, the most interesting were the pitcher plants, *Sarracenia flava, S. minor,* and *S. psittacina* from southwestern Georgia.

Some time was spent on the Cumberland Plateau of Tennessee, an area of especial interest to me, since many of the plants growing on the sandy and gravelly soils appear also on the most sterile parts of Long Island and Cape Cod. In other words, these plants now represented on the Atlantic Coastal Plain, have survived for countless ages on the flat sandstone surface of the Cumberland Plateau. There is great probability that they, together with the plants of the Great Smokies, represent the ancestral types from which a large part of the present vegetation of the eastern United States has been derived.

The Cumberland Plateau is botanically as interesting as the Great Smoky Mountains. Here and there in the northern part where the soil seems to be deeper (especially south of Jamestown), some gigantic yellow pines (*Pinus echinata*) remain, the survivors of the primeval forest of the "Great Wilderness." The clear rapid streams move through extensive thickets of *Rhododendron,* white azalea (*Rhododendron viscosum*), and *Stuartia.* In the waters of Clear Fork a *Potamogeton* was collected which Prof. M. L. Fernald will describe as a new species. Two years ago Professor Jennison, of the University of Tennessee, discovered the same plant in an immature condition growing in shallow water of the stream at Rugby, twenty miles to the northeast. Here, also, on sandy shores grows the wild rosemary (*Conradina verticillata*) known from nowhere else in the world. Rugby may be remembered as the utopian village set up in the American wilder-

ness fifty years ago by Thomas Hughes, a project foredoomed to failure if for nothing else than the sterile character of the surrounding fields. The English church and a few houses of English architecture still remain. Just below the church is the stream which I have mentioned, its banks of crumbled sandstone affording the most remarkable display of plants that it has been my fortune to see: *Magnolia macrophylla, Clethra acuminata, Rhododendron,* the rare native barberry (*Berberis canadensis*), *Silene rotundifolia,* box-huckleberry (*Gaylussacia brachycera*), *Liatris, Asplenium montanum,* the white flowers of *Trautvetteria* and *Boykinia,* and in the clear water itself the golden spikes of *Orontium.* In this region of the Cumberlands the climbing fern (*Lygodium palmatum*) is abundant and seems to be equally at home along stream openings, on shaded sandstone ledges, and in pathways through rhododendrons.

Proceeding westward I made my headquarters at Nashville (where I had collected plants in the summers of 1922 and 1930), and under the guidance of Dr. Shaver, of Peabody College, I was enabled to visit many places of interest. This area is well-known botanically for the extensive cedar glades which begin about ten miles east of the city. In the spring the flat limestones of the glades form natural rock-gardens, with an extraordinary and brilliant assemblage of flowering plants. "The somber tint of the cedar delineates a cedar barren from its surroundings at a distance, and serves within its environs to bring out with dazzling vividness the beautiful green of the glade grass, aglow with rose-colored petalostemons, sky-blue lobelias, golden Leavenworthias, schoenoliriums and shrubby hypericums . . . a natural conservatory that could fearlessly challenge any flower garden in the combined effect of gayety and luxuriance." [1]

The glades become parched during hot weather and lose their colorful plants, but the river gorges in the hills west of Nashville remain productive of interesting species throughout the summer. A visit to western Alabama, where a few days were spent with Dr. R. M. Harper, of the University of Alabama, allowed a glimpse of the bluffs and ravines along the Warrior River, with such curiosities as *Neviusia* (a Rosaceous shrub), *Croton ala-*

[1] Gattinger, Flora of Tennessee, p. 22 (1901).

bamensis (a shrubby species resembling *C. Scouleri* of the Galapagos Islands), *Croomia* (an extremely localized little plant, remotely related to *Smilax*), white-barked maple (*Acer leucoderme*), and great abundance of the dwarf horsechestnut (*Aesculus parviflora*) and the oak-leaved hydrangea (*H. quercifolia*), both widely known in cultivation. It was also my good fortune to go with Dr. Harper to the "chalk prairies," which lie to the southwest of Tuscaloosa and which form the highest geological strata of the "black belt." These have a sparse vegetation, consisting, among other things, of unusual types of *Rudbeckia* and *Silphium*. The otherwise fertile "black belt" stretches from southeast to northwest, a beautiful rolling prairie country dotted here and there with groves of oak and hickory or with scattered red cedars. The black belt now seems to be largely devoted to hayfields and cattle-raising.

From Tuscaloosa I proceeded to the long-leaf pine belt of southwestern Georgia, where I spent the first week of August. Here the cities and even the villages have an unexpectedly prosperous appearance, with up-to-date stores and hotels. Of outstanding interest in the vegetation were the great beds of pitcher plants (*Sarracenia*) occupying low places in the pine woods, and intermingled with them were the brilliant magenta flowers of *Rhexia glabella,* yellow-eyed grasses (*Xyris*), white button-like heads of *Eriocaulon,* and pink Marshallias. The thicket-margins were occupied by bright yellow *Hypericum* bushes.

There is a decided contrast between the burning heat of the pine woods of Georgia and the chilly air of the Great Smoky Mountains of Tennessee and North Carolina, which was my next stop. Through the kindness and cooperation of Dr. H. M. Jennison and his associates of the University of Tennessee, I spent a week at Elkmont, with access to the new mountain roads still unavailable to the public. At this season of the year the greatest display is seen on the high summits—masses of scarlet bee-balm (*Monarda didyma*) and dwarf *Rudbeckia* (*R. laciniata* var. *humilis*), the pink turtle-head (*Chelone Lyoni*), *Aster acuminatus,* and turk's-cap lily (*Lillium superbum*). The magnificent displays of *Rhododendron* and *Trillium* come earlier in the season. Dr. Jennison is now engaged in building up a museum as part of the National

Park service, a project which deserves the strongest support of all who are interested in the plants and animals of the southern Appalachians.

The material collected during the summer was sent from time to time to the Brooklyn Botanic Garden, and will be distributed through the seed exchange and through departmental exchanges of herbarium material.

The Herbarium

Statistics of the herbarium collections will be found at the end of this report. The phanerogamic herbarium now contains upwards of 100,000 specimens of flowering plants and ferns, represented chiefly by material from the United States. Its compactness and the close incorporation of reference books greatly facilitates the identification of collections, and has undoubtedly led to the greatly increased use of the herbarium by visitors. By the removal of one of the storage cases, some additional working space was obtained and the appearance of the herbarium has been greatly improved, but we are still limited in table space for visitting botanists. The greatest need at the present time is a well-trained student who can help with the organization of the collections and participate in publications based on the material in the herbarium. As in previous years, we are greatly indebted to the government relief workers who have been engaged in mounting plants, in stenographic work, and in sorting material.

Local Flora Section

This area continues under my care. The work of clearing out exotic material such as lilac and privet bushes, *Ailanthus,* willow trees, hawthorns, and other ornamentals planted long ago, proceeds slowly from year to year at a rate conformable to the growth of the more recently planted native trees and shrubs. As a gift from Dr. James N. Currie, we received an unusually large clump of showy ladies' slipper (*Cypripedium hirsutum*), to me the most spectacular of all our native plants. The soil has been carefully prepared for growing this unusual orchid, and next spring it should be a brilliant addition to the Local Flora Section. Of interest during the past year were the excellent growth of *Trillium undulatum* and *Dodecatheon Meadia,* the thriving colonies of *Viola*

FIG. 10. Trilliums in the Local Flora Section. May 7. (8580)

pedata, Corema, Hudsonia, Lupinus perennis, and *Arenaria caroliniana* in the sand area, the display of orchids (*Pogonia ophioglossoides* and *Calopogon pulchellus*) in the bog, and the rapid growth of well-established mats of creeping snowberry (*Chiogenes hispidula*), *Linnaea borealis,* and *Epigaea repens.*

Through the cooperation of WPA labor, supplied by the Department of Parks, a rock wall and pathway were constructed at the north-western end of the Section. Likewise through this cooperation two loads of broken serpentine rock were obtained from Staten Island. It is expected that the serpentine placed near the east entrance will be conducive to the growth of plants which have hitherto been unsuccessful in heavy garden soil. Several loads of peat were also obtained through the Park Department, adding greatly to the proper consistency of soil throughout the area. Our one great need is a limestone wall similar to the waterfall ledges in the Japanese Garden, upon which we can grow walking fern and other plants requiring shady calcareous habitats.

Classes

On October 8, 1934, I began a series of fifteen sessions on Plant Identification at the Horticultural Society of New York. Nine of the fifteen meetings took place in the fall and winter of 1934, the remaining six meetings were concluded on February 11th, 1935.

Respectfully submitted,

Henry K. Svenson,
Curator of the Herbarium.

Herbarium Material Borrowed for Study

Burton, Dr. E. Milby, Director, Charleston Museum, S. C.	2
California Academy of Sciences, San Francisco	33
Christophersen, Dr. Erling, University of Oslo, Norway	3
Fassett, Dr. Norman C., University of Wisconsin, Madison	15
Gray Herbarium, Harvard University, Cambridge, Mass.	17
Hanmer, Mr. Charles C., East Hartford, Conn.	134
Lippman, Dr. Theodore, University Tartu, Esthonia	3
Missouri Botanical Garden, St. Louis, Mo.	3
New York Botanical Garden, New York City	3,349
Philadelphia Academy of Natural Sciences	13
Total	3,572

Herbarium Material Loaned

Brody, Dr. Philip, Brooklyn, N. Y.	14
Core, Dr. E. C., Univ. of W. Va., Morgantown	2
Eaton, Mr. Richard J., Boston, Mass.	2
Hermann, Dr. F. J., Univ. of Michigan, Ann Arbor	322
Hopkins, Mr. Milton, Gray Herbarium, Harvard University	124
Hyde, Mrs. Clarence R., Brooklyn, N. Y.	42
Johnston, Dr. I. M., Arnold Arboretum, Jamaica Plain, Mass.	2
Long, Mr. Bayard, Philadelphia Academy of Natural Sciences	1
Manning, Dr. W. E., Smith College, Northampton, Mass.	2
Moldenke, Dr. Harold N. (at the Royal Botanic Gardens, Kew, England)	10
New York Botanical Garden	2
Ottley, Dr. Alice M., Wellesley College, Wellesley, Mass.	15
Pennell, Dr. F. W., Philadelphia Academy of Natural Sciences	83
Stacey, Mr. J. W., California Academy of Sciences, San Francisco	521
Waters, Dr. Campbell E., Washington, D. C.	7
Total	1,149

Herbarium Accessions and Distribution

Phanerogamic Herbarium

Accessions:

By Gift:

Coombs, Mrs. Jerome W.	160	
Daniels, Mrs. Gertrude	1	
Drushel, Dr. J. A.	73	
Hanmer, Mr. Charles C.	655	
Kittredge, Miss E. M.	36	
Provost, Miss Eva M.	2	
St. John, Mr. R. P.	21	948

By Exchange:

Blake, Mr. S. T., University of Queensland, Australia	50	
California, University of, Berkeley	210	
Clark University, Worcester, Mass.	119	
Deam, Mr. C. C., Bluffton, Indiana	18	
Demaree, Dr. Delzie, Yellow Springs, Ohio	83	
Eig, Dr. A., Hebrew University, Palestine	300	
Fassett, Dr. Norman C., University of Wisconsin, Madison	6	
Gilbert, Dr. F. A., Marshall College, W. Va.	100	
Gray Herbarium, Harvard University	217	
Hermann, Dr. F. J., Univ. Michigan, Ann Arbor	70	
House, Dr. H. D., N. Y. State Museum, Albany	1	

Maxon, Dr. W. R., U. S. National Museum	18	
Muenscher, Dr. W. C., N. Y. State College of Agriculture	93	
New York Botanical Garden	91	
Steyermark, Dr. J. A., Missouri Botanical Garden	2	
Thompson, Mr. J. W., Seattle, Wash.	754	
Underwood, Mr. J. K., Univ. Tennessee, Knoxville	46	2,178

By Purchase:

Harper, Dr. R. M., University of Alabama	221	
Kittredge, Miss E. M., Vergennes, Vt.	150	371

By Collection:

Svenson, Dr. Henry K., Brooklyn Botanic Garden	5,402	
Vilkomerson, Miss Hilda, Brooklyn Botanic Garden	5	5,407
Total		8,904

Distribution:

By Exchange:

Anderson, Prof. W. A., Iowa State University	43	
Barros, Dr. Manuel, Buenos Aires, Argentina	3	
Benner, Mr. Walter M., Philadelphia Acad. Nat. Sciences	1	
California, University of, Berkeley	107	
Clark University, Worcester, Mass.	83	
Cluj, Roumania, Jardin Botanique de l'Université	102	
Fedchenko, Dr. B. A., Jardin Botanique Principal, Leningrad, U. S. S. R.	7	
Gray Herbarium, Harvard University	411	
Hermann, Dr. F. J., University of Michigan, Ann Arbor	7	
Howell, Mr. John T., Calif. Acad. Sciences, San Francisco	1	
Jennison, Dr. H. M., Univ. Tennessee, Knoxville	13	
Leningrad, U. S. S. R., Academy of Sciences	47	
Manning, Dr. W. E., Smith College, Northampton, Mass.	113	
Missouri Botanical Garden, St. Louis	302	
New York Botanical Garden, New York City	1	
Ostén, Mr. Cornelius, Montevideo, Uruguay	1	
Pennell, Dr. F. W., Phila. Academy Natural Sciences	1	
Schweinfurth, Mr. C. H., Botanical Museum, Harvard Univ.	3	
Smith, Dr. Lyman B., Gray Herbarium, Harvard Univ.	10	
Stebbins, Dr. Ledyard, Univ. California, Berkeley	15	
Thompson, Mr. J. W., Seattle, Wash.	450	
Wiegand, Dr. K. M., Cornell University	1	1,722
Total		1,722

Cryptogamic Herbaria

Accessions:		
Fungi:		
By Exchange:		
California, University of, Berkeley	72	
Dr. T. F. Yu, University of Nanking, China	98	170
By Purchase:		
Zillig, Dr. H., Berncastel-Cues, Germany	20	20
Total		193
Other Cryptogams:		
By Gift:		
Studhalter, Dr. R. A., Texas Tech. College, Lubbock	1	
By Exchange:		
Delft, Holland, Jardin Botanique de l'Université	2	
Sharp, Mr. A. J., University of Tennessee, Knoxville	3	
By Purchase:		
Fr. Verdoorn, Leiden, Holland	50	
By Collection:		
Svenson, Dr. Henry K., Brooklyn Botanic Garden	13	69
Total		69

Seed Exchange

Seed Packets Received:		
By collection	134	
By exchange	1,893	
By gift	37	
By purchase	162	2,226
Total		2,226
Seed Packets Distributed:		
By exchange	3,972	
To members	502	4,474
Total		4,474

FIG. 11. Roses in bloom, November 15, 1935. (8851)

REPORT OF THE HORTICULTURIST AND HEAD GARDENER FOR 1935

DR. C. STUART GAGER, DIRECTOR.

Sir: I submit herewith my report for the year ending December 31, 1935.

PERSONNEL

The regular force of gardeners and laborers was substantially the same as in 1934.

Labor Paid for by Governmental Relief and Charitable Organizations

Two men, under the auspices of the Civil Works Service (until May 7) and the Works Progress Administration, worked 6 hours a day from January 1 to December 31 for a total of	526 days
Eight men from the WPA, under their own foreman, worked 6 hours a day for 15 days a month during September and October for a total of	240 "
Also from the WPA, we had the services of from 9 to 14 men 5 days a week from May 7 to December 31, a total of	1,266 "
(These men were classified as "guards" and were assigned to the gates and used for patrolling the grounds.)	
The Brooklyn Bureau of Charities sent 18 men who, at various times, worked 8 hours a day for a total of	1,104 "
Total labor paid for by organizations other than the Botanic Garden	3,136 "

SYSTEMATIC SECTION

The Violales area was largely replanted. The actinidias (7 in all) were transferred to the concrete and wood pergola designed by the consulting landscape architect, and installed as a TERA project. The tamarisks were replanted and set opposite the openings in the pergola. It was necessary to dig to a depth of 4 feet to ensure successful transplanting. Alternate trees of *Gordonia* were removed and planted to extend the line southwards.

Crop rotation is recognized as a desirable practice. Usually, it is effected by moving the crop, but in the systematic section this is not possible owing to the arrangement of the plant families in botanical sequence. Therefore, when it seemed desirable to give

our chrysanthemum plantings new soil to secure better growth, we exchanged the soil from three of the beds for an equivalent amount from the canna beds. Thirty-five truck-loads were moved.

When flower beds are set in turf, from time to time the edges get out of shape because of traffic, wear and tear, and over-growth of the plants. All of the edges of the beds in the systematic section were "trued up" in 1935.

A specimen of *Ulmus serotina* was dug up and burned because it was affected with the Dutch elm disease.

Horticultural Section

Most of the new work centered in the Horticultural Section, formerly known as the North Addition. The structural work, topsoiling and rough grading was carried out as a WPA project.

Over 98,000 square feet of final grading was done by men under Mr. Herman Varrelman, our foreman of laborers, and over 70,000 square feet was seeded to lawn grasses in September. A two and a half inch layer of peat moss was applied to the planting areas—about 28,000 square feet.

About 230 trees, 1,533 shrubs, and 40 vines were planted. These, with the exception of about 450 which were purchased, were received as an exchange from the nurseries of the Department of Parks.

Over 2000 plants, in approximately 30 species and varieties (propagated in the Garden) were planted in the lower retaining wall. Rooted cuttings of Virginia creeper (400) were planted in the upper wall.

Lilac Area

In furtherance of a plan devised by Dr. Gundersen and Mr. Caparn for regrouping the lilacs by "singles," "doubles," and color; 10 large bushes were transplanted, 40 new plants set out, and 25 plants removed from the area.

Japanese Garden

About 30 Azalea "Hinodegiri" and 35 *Azalea ledifolia* were planted in the Japanese Garden under the direction of Miss Averill. These plants were part of the shipment obtained in exchange from the Park Department.

Rose Garden

The roses in one of the large beds devoted to Hybrid Tea varieties have never thrived. On the chance that the poor soil or drainage may have been the cause of their failure, drainage was put in and the soil of half the bed was removed and replaced with new soil.

During the open weather of December, all the walks were regraded because of inequalities which had developed during their eight years of service.

Conservatories

The exhibit in House No. 2, illustrating plant evolution, was entirely revised in accordance with plans made by Dr. Gundersen. The central bench was lowered to afford a better view. The whole house is now devoted to the evolution exhibit instead of, as formerly, merely the central bench.

Miscellaneous

Japanese beetles appeared in greater numbers in 1935. Until now we have been able to keep them in check by hand-picking, and thus avoided making the plants unsightly with spray solution. But if they continue to increase, it will be necessary to spray to protect our plants.

The nursery was extended southwards by removing large trees and shrubs of no particular value. The area was graded and the soil improved by the addition of peat.

In the course of twenty years, the level of the nursery has been lowered due to the removal, year after year, of plants with a ball of earth about their roots. This has resulted in poor surface drainage and injury to some of the plants in consequence. To remedy this condition, the level was raised by the use of topsoil from the nursery roadway, which was replaced by coal ashes.

A new gate (12′ x 5′) to the service yard near the South Flatbush Avenue entrance was made and installed.

Three hundred feet of irrigation pipe was laid and six faucets attached.

A new wagon body for the tractor was constructed by the foreman of laborers.

FIG. 12. Exhibit of gardening operations. International Flower Show, March 18–23. General view. Cf. Fig. 11. (8733)

Depressions in the lawns, caused by subsidence, were filled and reseeded. Sparsely furnished areas in the lawns, to the extent of about 5000 square feet, were reseeded.

Exhibits

The Botanic Garden's exhibit of "Garden Operations," at the Twenty-second Annual International Flower Show, was awarded a silver medal. A *Leaflet* was prepared, describing the exhibit which illustrated: digging, lawn making, seed sowing, planting, thinning, potting, staking, cultivation, and other operations.

Twelve large xerophytic plants were loaned to Dr. C. Edward Jones, treasurer of the Albany (N. Y.) Municipal Flower Show, to be used in an exhibit of desert plants at the Albany Show, in September.

Seed and Plant Distribution

In connection with the International Seed Exchange, 3972 packets of seed were distributed to foreign and domestic botanic gardens and other institutions. We also distributed 502 packets of seed to members of the Botanic Garden.

Surplus plants of Chrysanthemum, Iris, and miscellaneous herbaceous plants, totaling 8190, were distributed to 273 members in April.

We provided the Department of Parks (Brooklyn nursery) with 6000 Iris divisions in 72 species and varieties, and about 1200 plants of hardy Chrysanthemums.

Received from the Department of Parks

We received from the Park Department 1392 trees and shrubs in 32 species and varieties. These were planted in the Horticultural Section and in the Japanese Garden.

About 420 cubic yards of peat was delivered to the Botanic Garden from a bog in Juniper Valley Park, Borough of Queens, and belonging to the City of New York. As usual, for many years past, about 100 loads of leaves were received from Prospect Park.

Courses of Instruction

I conducted the following "Courses for Members and the General Public" at the Botanic Garden:

Practical Gardening. A Saturday afternoon course. Five talks with demonstrations.

Plants in the Home: How to Grow Them. Five talks with demonstrations.

Personal Activities

I acted as a judge at the following flower shows:

March 18. Federated Garden Clubs of New York State, International Flower Show, New York City.

August 27. Garden Club Exhibits, Dutchess County Fair, Rhinebeck, New York.

September 12. Flower Show of the Garden Club of the Consolidated and Affiliated Gas Companies, New York City.

An official trip to the West Coast under the auspices of the Botanic Garden made it possible for me to make many profitable horticultural contacts.

The first stop was made in Cincinnati where the second annual meeting and the first exhibition of the American Rock Garden Society was held. I presided at the meetings and gave an illustrated talk on "Plants for the Rock Garden."

At St. Louis, the Missouri Botanical Garden, including the comparatively new development at Grey Summit, was visited. At Grey Summit (near St. Louis), a tract of about 1,600 acres of diversified contours provides almost unlimited horticultural possibilities. It is here, in the extensive ranges of houses, that the orchids are grown to blooming stage for display in the conservatories of "Shaw's Garden," in St. Louis.

At Colorado Springs, I had an opportunity of seeing alpine plants growing in the nursery (at Upton Gardens) and also in the wild. I addressed the Broadmoor Garden Club on the subject of "Rock Gardening." The members evinced much interest in the work of the Botanic Garden.

In the high country around Santa Fé and in the vicinity of the Grand Canyon, many plants were noted which should prove of value in eastern rock gardens.

FIG. 13. Exhibit at International Flower Show, 1935. How to plant a tree. Detail of Fig. 10. (8735)

With Los Angeles as headquarters, many interesting public, private, and commercial gardens were visited. The Huntington Botanical Garden, at San Marino, is noteworthy for its extensive cactus gardens and its collections of subtropical plants. There are several nurseries in the vicinity of Los Angeles which make a specialty of rare plants, including the Coolidge Rare Plant Gardens at Pasadena, and the Evans' Gardens at Santa Monica.

On the way to San Diego, a stop was made, by invitation of Mrs. Susanna Bixby Bryant, at the Rancho Santa Ana Botanic Garden. This garden of 200 acres was founded by Mrs. Bryant in memory of her father, John W. Bixby. Among other purposes, it is hoped to grow all the California species capable of thriving in the garden. The setting of the garden is magnificent, and much has already been accomplished in assembling Californian plants and displaying them in naturalistic plantings.

In San Diego, Balboa Park and several private gardens were visited under the guidance of Park Superintendent John Morley. Miss Kate Sessions, one of the outstanding horticultural personalities of California, showed me many small private gardens.

At Santa Barbara, several large estates were visited under the guidance of Mr. Lockwood de Forest. Dr. E. J. Bissell, Director of the Blaksley Botanic Garden, conducted me through that Garden, where plants native to California are displayed to call attention to their horticultural value. Through the good offices of Mr. Curtis Redfern, I was enabled to see the famous "Sacred Garden" in the Santa Barbara Mission under the guidance of Father Stephen Mahoney.

A week was spent in San Francisco visiting Golden Gate Park, the University of California Botanic Garden, and various private gardens and nurseries. I was invited to attend and address a meeting of the California Horticultural Society in San Francisco, and was made the first Corresponding Member of the Society.

In Portland, through the kindness of Mr. Fred Borsch (who, incidentally, has a wonderful collection of alpines in his nursery), a trip was taken to the region of Mt. Hood to observe the native flora. Several private gardens noted for their plant collections were visited.

At Seattle, I addressed a meeting called in support of the

"Arboretum Foundation" of the University of Washington, and also spoke at a meeting of the Washington unit of the American Rock Garden Society.

A trip was made to Mt. Rainier where we stayed overnight at Yakima Park. A number of alpine plants were collected on Burrough's Mountain. A collecting trip to Tipsoo Lake and the Chinook Pass was arranged by the local unit of the American Rock Garden Society. This proved very interesting. Mr. and Mrs. Carl S. English, Jr., provided transportation to Mt. Rainier and extended many courtesies during my stay in Seattle.

A hurried trip to Victoria, B. C., disclosed many gardens where alpines were grown to perfection.

In Vancouver, Superintendent Rawlings of the Park Department was instrumental in making it possible for me to see much of horticultural interest, including Stanley Park, many private gardens, and the summit of Grouse Mountain.

Respectfully submitted,

MONTAGUE FREE,
Horticulturist and Head Gardener.

REPORT ON THE LIBRARY FOR 1935

DR. C. STUART GAGER, DIRECTOR.

Sir: In the absence of a librarian, the annual report on the library and its work is herewith presented by the assistant in charge.

ACCESSIONS

During 1935, 879 pieces (245 volumes and 634 pamphlets) were added to the collection, making a total of 18,770 volumes and 15,378 pamphlets (a grand total of 34,148 pieces) now on the shelves. This is a very small increase for a much used department. Many new titles, new editions, and the completion of sets could have been ordered to advantage had we possessed funds. For the research worker especially, it is essential that the library keep abreast of the literature in the field. Unfortunately, this has been impossible of accomplishment for several years, so that we are at present working under the grave disadvantage of not having many

of the new and recent publications of the more popular type. The scientific aspect of the work fares somewhat better, as there are many technical periodicals, journals, etc., which are regularly received by means of exchange, subscription, and gift lists. Of the year's accessions, 107 volumes, 354 pamphlets, and 833 parts, including current numbers of 72 periodicals, were received as gifts. A complete list of the donors will be found in Appendix I.

Periodicals and serials accepted in exchange number 756, as gifts 72, by subscription 127, and as our own publication 7, a total of 962 titles of which current numbers were received during the year.

LIST OF SOME IMPORTANT ACCESSIONS

Arber, Agnes. The Gramineae a study of cereal, bamboo, and grass. New York, 1934.

Bardswell, F. A. The herb-garden. London, 1930.

Book of choice ferns. New York and London, n.d. 7 vols.

Boyle, Robert. Certain physiological essays. . . . London, 1661.

Delessert, Benjamin. Icones selectae plantarum. . . . 5 vols. Paris, 1820–1846.

Elliott, Clarence. Rock garden plants. New York and London, 1935.

Ewart, A. J. Flora of Victoria. Melbourne, 1930.

Hedrick, U. P. A history of agriculture in the state of New York. Albany, 1933.

Jung, Joachim. Opuscula botanico-physica. . . . Coburg, 1747.

Korsmo, Emil. Weed seeds. Oslo, 1935.

Lamarck, J. B. Système des animaux sans vertèbres. Paris, 1801.

Lemée, Albert. Dictionnaire descriptif et synonymique des genres de plantes phanérogames. V. 6. Brest, 1935.

Linné, Carl von. Oratio, qua peregrinationum inter patriam asseritur necessitas. . . . Upsala, 1741.

Markham, Ernest. Clematis. London, [1935].

Martineau, Lady. The herbaceous garden. London, c1913, 1934.

Matthew, Patrick. On naval timber and arboriculture. London, 1831.

Michaux, F. A. Histoire des arbres forestiers de l'Amérique septentrionale. . . . Paris, 1810. (With preliminary draft Mss. and original colored drawings by P. J. Redouté, H. J. Redouté and others, [1810].)

Narrative of the surveying voyages of His Majesty's ships Adventure and Beagle, between the years 1826 and 1836. 3 vols. and supplement. London, 1839. (V. 3 by Charles Darwin. Journal and remarks. 1832–36.)

Nicholson, George. Illustrated dictionary of gardening. 8 vols. London, 1887.
Padua. L'horto de i semplici de Padoua. . . . Venice, 1591.
Porta, G. B. Magiae naturalis libri XX. Naples, 1589.
Sowerby, J. de C. English botany. . . . 25 vols. London, 1790–1807. Supplement. 4 vols. 1831–1849.
Spiegel, Adrian. Isagoges in rem herbariam libri duo. Lugduni Batavorum, 1633.
Stout, A. B. Daylilies. New York, 1934.
Tabernaemontanus, J. T. Neuw kreuterbuch. . . . 2 pts. in 1 v. Frankfort, 1588–1591.
Thomas, Meirion. Plant physiology. Philadelphia, 1935.
Thunberg, C. P. Miscellaneous papers regarding Japanese plants. Tokyo, 1935. (Facsimile reprint.)
van Laren, A. J. Cactus. Los Angeles, 1935.
——— Succulents. Los Angeles, 1934.
Westveld, R. H. Applied silviculture in the United States. Ann Arbor, Mich., 1935.
Journal de botanik ; ed. by Louis Morot. Paris, 1908–1913. Ser. 2. V. 1–3.
Russia. Leningrad. Bulletin of applied botany. . . . St. Petersburg, 1908–1915. V. 1–8.

Special Exhibition

For the Twenty-fifth Anniversary celebration, the library arranged an exhibition of books and manuscripts illustrating the history of botany. Wall and floor cases and two long tables were utilized to display volumes open at interesting pages, plates, portraits, autographs, etc. In this connection an annotated list was prepared, giving a brief description of each item and its importance to the scientific world. This was published as the July number of the Brooklyn Botanic Garden Record, and has proved a convenient check-list to the material.

The exhibit was divided into groups as Incunabula, other pre-Linnean works, Linnean first editions, post-Linnean botanical classics, books of association interest, Darwiniana, autographs and autograph letters, and the publications of the Brooklyn Botanic Garden.

One of the most interesting items was the copy of the "Quarterly Review" for July, 1860, containing a virulent review of the "Origin of Species." The authorship was later acknowledged by Samuel Wilberforce, then Bishop of Oxford. The article is ac-

companied by a seven-page manuscript in the handwriting of Charles Darwin, refuting its extraordinary statements. These notes were prepared by Darwin for Sir Joseph Hooker, and suggest points of attack against the bishop. This appears to be the actual copy of the article in Hooker's hands during the now famous meeting of the British Association in Oxford, July, 1860. Another item among the Darwiniana was a copy of the original issue of the Darwin-Wallace paper, "On the tendency of species to form varieties," published in the Journal of the Proceedings of the Linnean Society of London, V. 2, No. 9, 1858.

In the first case on view were seven books, printed before the year 1500, opened at pages showing the clearness and beauty of the early typography and the very conventionalized studies of plants used as illustrations. The long tables showed advances in the technique employed in the making of botanical illustrations, from the earliest herbals and the beautiful and naturalistic wood-cuts of Brunfels and Fuchs, through the later methods of copper engraving, lithography, "nature printing," photography, and other modern methods.

Among the early scientific books was one by Nicolaus de Cusa, printed in Paris in 1514, in which the author describes one of the first biological experiments of modern times. He weighed seeds and planted them in 100 pounds of soil. Afterwards, he weighed the soil and the plants that grew from the seed. Since the soil lost little in weight he concluded that the plants acquired most of their weight from the water which had been given them. One hundred and thirty-seven years later, van Helmont described a similar experiment, "pirated," says Singer, from Cusanus. It was two hundred and thirteen years after de Cusa that Hales, in his "Vegetable Staticks" (1727), described his own quantitative experiments with plants.

First editions of many rare old books on botany and medicine were shown, among which were choice copies of Dodonaeus, Fuchs, Gerarde, and Mattioli. One of the earliest landmarks in the history of microscopy, Robert Hooke's beautiful "Micrographia . . . ," 1665, was placed with van Leeuwenhoek's volumes of "Arcana naturae," 1695, and "Ontledingen . . . van de cinnabar naturalis," 1686. Van Leeuwenhoek constructed his own micro-

scope, and made many discoveries of importance to biology and medicine.

Several volumes by John Ray, who has been called "the father of English naturalists," traced his work from the little "Catalogus plantarum circa Cantabrigiam," 1660, his first book, to the large two volume and supplement "Historia plantarum . . . de plantis in genere . . . ," 1686–1704, in which he summarizes the chief facts then known about the functions and structure of plants, and describes 18,625 species.

A small group of first editions of Carl von Linné filled another case, together with an autograph letter from Linné to the Duc de Chêsne, one of the library's prized possessions. The post-Linnean books covered a wide range, including foundational literature of the sciences of ecology, heredity, and genetics. There was a copy of Spallanzani, "Nouvelles recherches sur les découvertes microscopiques et la génération des corps organisés . . . ," 1769, which was one of the first experimental disproofs of the doctrine of spontaneous generation. Included with this was the original publication of Mendel's paper, "Versuch über Pflanzen-Hybriden," in volume 4 of the "Verhandlungen" of the Naturforschenden Verein, Brünn, the now famous description of his breeding experiments with peas, which laid the foundations of the modern science of genetics.

This exhibition, although consisting of only a small part of the collection, proved of great interest to the scientists who attended the meetings during the anniversary celebration, and to many others, students and visitors, who came at a later date to inspect the work of the library.

Regular Service to Readers

Throughout the year, the regular library routine was maintained. Service to other institutions, to students, and to our own staff continued as usual, and small displays of seed catalogs, books, pictures, etc., were made from time to time. In December, approximately 300 books were prepared and sent to the bindery, about one quarter of the material now ready and waiting for binding. Work on the preparation of pamphlets was discontinued, owing to lack of covers,

which we hope to procure early in 1936. The pamphlet collection is proving more and more valuable, as it is often difficult to trace an elusive paper, especially when published in a foreign periodical which can not be readily consulted. Our reprints, being cataloged by author, often with a subject card, are easily found.

Interlibrary Loans

During the year, 123 volumes were loaned to: Arkansas Agricultural Experiment Station, Fayetteville, Ark.; Barnard College Library, New York; Biological Laboratory, Cold Spring Harbor, L. I.; Brooklyn Children's Museum; Brooklyn Museum Library; Brown University Library, Providence, R. I.; Carnegie Institution of Washington, Dept. of Genetics, Cold Spring Harbor, L. I.; University of Chattanooga, Chattanooga, Tenn.; Columbia University Library, New York; Coshocton Public Library, Coshocton, O.; Imperial Institute of Agricultural Research, Pusa, India; Mason Library, Great Barrington, Mass.; Massachusetts State College Library, Amherst, Mass.; Murray State Teachers College, Murray, Ky.; National Oil Products Company, Harrison, N. J.; New Hampshire University Library, Durham, N. H.; The Horticultural Society of New York, Inc.; New York State College of Agriculture, Cornell University, Ithaca, N. Y.; Nyack Public Library, Nyack, N. Y.; Rockefeller Institute for Medical Research, New York; Suffolk County Sanatorium, Holtsville, L. I.; University of Tennessee, Knoxville, Tenn.; Western Electric Company, New York; American Fern Society.

We borrowed 73 volumes from: American Geographical Society, New York; American Museum of Natural History, New York; Brooklyn Museum Library; Brooklyn Public Library; Columbia University Library, New York; New York Botanical Garden; New York University; Pratt Institute Free Library, Brooklyn, N. Y.; U. S. Department of Agriculture Library, Washington, D. C.

The statistical report follows.

Respectfully submitted,

Emilie P. Chichester,
Library Assistant in Charge.

STATISTICAL REPORT ON THE LIBRARY

Accessions

	Autograph Letters	Portraits	Volumes	Pamphlets	Parts (Including Periodicals)
Exchange	0	0	21	131	3,462
Gift	12	18	107	354	833
Publication	0	0	0	142	59
Purchase	1	2	113	7	961
By binding	0	0	4	0	0
Total	13	20	245	634	5,315

Total number of volumes in library, December 31, 1934	18,525
Number of volumes added during 1935	245
Total number of volumes in library, December 31, 1935	18,770
Total number of pamphlets in library, December 31, 1934	14,744
Number of pamphlets added during 1935	634
Total number of pamphlets in library, December 31, 1935	15,378
Total number of volumes and pamphlets in library, December 31, 1934	33,269
Net increase of volumes and pamphlets during 1935	879
Total number of volumes and pamphlets in library, December 31, 1935	34,148

American Fern Society Collection

Number of volumes, December 31, 1934	42
Number of volumes added during 1935	1
Total number of volumes, December 31, 1935	43
Number of pamphlets, December 31, 1934	239
Number of pamphlets added during 1935	3
Total number of pamphlets, December 31, 1935	242
Number of parts added during 1935	37

Serials and Periodicals

(Including only those of which numbers were received in 1935)

Subscription	127
Gift	72
Exchange	756
Publication	7
Total	962

Cataloging

Books, Pamphlets, and Serials cataloged	561
Total number of cards typewritten and filed	1,395

Printed Cards

Torrey Botanical Club index cards on file, December 31, 1934	48,100
Filed during 1935	1,649
Total, December 31, 1935	49,749

Miscellaneous

Number of users of the library	4,528
Books lent to members of the staff	1,577
Books lent to other institutions	123
Books borrowed from other institutions	73

REPORT OF THE RESIDENT INVESTIGATOR (FERNS) FOR 1935

Dr. C. Stuart Gager, Director:

Sir: I submit herewith my report for the year ending December 31, 1935.

School Service

Continuing as Chairman of the Program Committee of the New York Association of Biology Teachers, the program for 1935–36 was worked out with Mr. Julius M. Johnson, President, and practically completed by June 1, 1935. Among the six programs arranged, two have botanical aspects. For November, the retiring Director of the City Laboratories, Dr. William H. Park, was represented by an assistant who summed up present knowledge regarding filterable viruses.

During the fall I was appointed as the College representative in biology on the Science Council of the New York City High School System.

Editorial Work

With 1935, the 25th volume of the *American Fern Journal* was completed. Begun as an experimental publication in the summer

of 1910, it was taken over as the official organ of the American Fern Society in 1911. The first volume consisted of the regular four numbers for 1911, plus two experimental issues published in 1910. Your Resident Investigator takes pride in having been one of the founders of the magazine, as well as in having had a continuous editorial connection throughout its more than 25 years of existence. Mr. C. A. Weatherby, Gray Herbarium, is, at present, chief of the editorial staff, which includes Mr. E. J. Winslow, Brattleboro, Vermont, and Dr. William R. Maxon, Smithsonian Institution, Washington, D. C. Dr. Edgar T. Wherry of the University of Pennsylvania is President of the Society.

The *American Fern Journal* and the American Fern Society are in great debt to the Brooklyn Botanic Garden for providing a headquarters for much of the business of the periodical. The back numbers are stored at the Botanic Garden, and requests for information, sample copies, and so on, are also received at the Garden, either through Dr. Svenson, of the Garden staff, who is Treasurer of the Society, or through the Resident Investigator. It has been and still is the policy of the Fern Society to maintain complete sets of the entire issue of the Journal. To do this, it has been necessary, in one case, to reprint one of the early issues. At present, several complete sets are available, but a number of the early issues have been so depleted that further reprinting will be necessary.

The general policy of the Fern Journal is to provide a medium for the publication and dissemination of information regarding ferns, both popular and technical. Its membership, while chiefly American, has a world-wide distribution.

Fern Work

Work with the ferns during 1935 has had to do chiefly with the maintenance of collections on the best possible basis. A considerable set-up of *Nephrolepis* forms was arranged and shown during the Garden's 25th anniversary celebration. During the year, an interesting collection of aquatic fern types has been assembled in House No. 1. This includes representatives of the following families: *Marsileaceae, Salviniaceae,* and *Ceratopteridaceae.* Five genera are represented in this collection, as follows: *Marsilea, Pilularia, Salvinia, Azolla,* and *Ceratopteris.*

Some collections have been sent to several inquirers interested in fern material for use in scientific research and assistance in horticulture.

Plant Conservation

Not a few inquiries regarding plant conservation have been received and answered during the year by letter and by means of appropriate *Leaflets*.

In June a considerable number of mature Hartstongue plants (*Scolopendrium vulgare*), raised in the Propagating House by Joseph Bass, were sent to interested people, who defrayed the cost of packing and postage.

Respectfully submitted,

Ralph C. Benedict,
Resident Investigator (Ferns).

REPORT OF THE RESIDENT INVESTIGATOR (ECONOMIC PLANTS) FOR 1935

Dr. C. Stuart Gager, Director:

Sir: I submit herewith a report of the activities of the Resident Investigator for Economic Plants during 1935. A course in Economic Plants was offered during the current year. This work was supplemented by lantern slides, the investigator's collection of economic plant products, and the living species available in the Botanic Garden Conservatories.

For display during the Twenty-fifth Anniversary Week in commemoration of the establishment of the Brooklyn Botanic Garden, a collection of the wild and cultivated species and varieties of the genus *Coffea* Linn. was organized. In addition to the living coffee plants in the central plant house, herbarium specimens were obtained from all of the coffee-producing areas of the world. This was made possible by the generous assistance of the British Colonial governments of eastern and western Africa and India. The Brazilian and Colombian agricultural departments were also gratifyingly cooperative. A special exhibit of the fruits and seeds (beans) from the various species and geographical areas and in the several stages of their commercial preparation was presented.

The histology of the fruit and seed was shown by microscopic preparations and the effect of the beverage upon man was stated in pamphlets which were available for distribution to the visitors.

Respectfully submitted,

RALPH H. CHENEY,
Resident Investigator (Economic Plants).

FINANCIAL STATEMENT FOR 1935

I. TAX BUDGET ACCOUNTS

1530 *Personal Service: (Regular Employees)*
1531 " " *(Temporary Employees)*

Appropriation		$ 69,085.68
Expended		69,085.68

Other Codes than Personal Service:

Code 1532 Fuel Supplies:

Appropriation		$ 3,500.00
Transferred to General Purchase Fund	$ 3,500.00	
Expended		3,483.56
Balance, December 31, 1935		$ 16.44

Code 1533 Office Supplies:

Appropriation		$ 400.00
Expended		400.00

Code 1534 Laundry, Cleaning and Disinfecting Supplies:

Appropriation		$ 130.00
Expended		130.00

Code 1535 Botanical and Agricultural Supplies:

Appropriation		$ 2,000.00
Expended	$ 1,858.63	
Transferred to Code 1542	141.37	2,000.00

Code 1536 Motor Vehicle Supplies:

Appropriation		$ 100.00
Transferred to General Purchase Fund	$ 100.00	
Expended		79.06
Balance, December 31, 1935		$ 20.94

Code 1537	General Plant Supplies:			
	Appropriation		$ 275.00	
	Transferred from Code 1544		1.12	
	" " " 1545		12.05	$ 288.17
	Expended			288.17
Code 1538	Office Equipment:			
	Appropriation			$ 40.00
	Expended			40.00
Code 1539	General Plant Equipment:			
	Appropriation			$ 1,590.00
	Expended			1,590.00
Code 1540	General Plant Materials:			
	Appropriation			$ 1,000.00
	Expended			1,000.00
Code 1541	Repairs and Replacements:			
	Appropriation		$ 2,580.00	
	Transferred from Code 1543		11.29	
	" " " 1544		2.15	$ 2,593.44
	Expended			2,593.44
Code 1542	Light, Heat and Power:			
	Appropriation		$ 500.00	
	Transferred from Code 1535		141.37	
	" " " 1543		41.03	$ 682.40
	Expended			682.40
Code 1543	Telephone Service:			
	Appropriation			$ 500.00
	Expended		$ 447.68	
	Transferred to Code 1541		11.29	
	" " " 1542		41.03	500.00
Code 1544	Carfare:			
	Appropriation			$ 60.00
	Expended		$ 56.73	
	Transferred to Code 1537		1.12	
	" " " 1541		2.15	60.00
Code 1545	Expressage and Deliveries:			
	Appropriation			$ 200.00
	Expended		$ 187.95	
	Transferred to Code 1537		12.05	200.00

Code 1546 General Plant Service:		
Appropriation	$	400.00
Expended		400.00
Code 1547 Contingencies:		
Appropriation	$	50.00
Expended		50.00

Summary of Tax Budget Accounts:

Appropriated		
Personal Service	$	69,085.68
Other Codes		13,325.00
	$	82,410.68
Expended		82,373.30
Balance, December 31, 1935	$	37.38

II. Private Funds Accounts

1. *Endowment Fund* ($50,500.00) *Restricted:* *

Income Account:		
Income 1935	$	2,020.00
Transferred to Special Contributions		2,020.00
	$	0.00

2. *Life Membership Fund* ($7,000.00) *Restricted:*

Income Account:		
Income 1935	$	280.00
Transferred to Annual Membership Account		280.00
	$	0.00

3. *George C. Brackett Library Fund* ($500.00) *Restricted:*

Income Account:			
Balance, January 1, 1935	$ 4.02		
Income 1935	20.00	$	24.02
Expended			24.02
		$	0.00

4. *Benjamin Stuart Gager Memorial Fund* ($13,417.20) *Restricted:*

Income Account:			
Balance, January 1, 1935	$ 49.68		
Income 1935	536.68	$	586.36
Expended			560.33
Balance, December 31, 1935		$	26.03

* Restricted funds are those limited by terms of gift, bequest, or solicitation, to the scientific and educational work of the Garden.

5. *Martha Woodward Stutzer Memorial Fund* ($10,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1935	$ 5.11	
Income 1935	400.00	$ 405.11
Expended		405.11
		$ 0.00

6. *Mary Bates Spalding Fund* ($2,697.00) *Restricted:*

Income Account:		
Balance, January 1, 1935	$ 61.87	
Income 1935	107.88	$ 169.75
Expended		60.00
Balance, December 31, 1935		$ 109.75

7. *Alfred T. White Fund* ($243,149.27) *Restricted:*

Income Account:		
Balance, January 1, 1935	$ 227.69	
Income 1935	9,725.96	$ 9,953.65
Transferred to Special Contributions		9,953.65
		$ 0.00

8. *A. Augustus Healy Bequest* ($9,798.31) *Restricted:*

Income Account:		
Income 1935		$ 391.92
Transferred to Special Contributions		391.92
		$ 0.00

9. *Robert B. Woodward Bequest* ($25,000.00) *Restricted:*

Income Account:		
Income 1935		$ 1,000.00
Transferred to Special Contributions		1,000.00
		$ 0.00

10. *Alfred T. White Memorial Tablet Fund* ($3,889.85) *Restricted:*

Income Account:		
Income 1935		$ 155.56
Transferred to Special Contributions		155.56
		$ 0.00

11. *Brooklyn Institute Centennial Fund B. B. G. Share* ($30,000.00) *Restricted:*

Income Account:		
Income 1935		$ 1,200.00
Transferred to Special Contributions		1,200.00
		$ 0.00

12. *John D. Rockefeller, Jr. Fund* ($250,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1935	$ 25.75	
Income 1935	10,000.00	$ 10,025.75
Transferred to Special Contributions		10,025.75
		$ 0.00

13. *Citizens Endowment Fund* ($253,929.26) *Restricted:*

Income Account:	
Income 1935	$ 10,157.15
Transferred to Special Contributions	10,157.15
	$ 0.00

14. *Sustaining Membership. Restricted:*

Balance, January 1, 1935	$ 0.00	
Received from dues	466.51	$ 466.51
Transferred to Annual Membership Account		349.89
Balance, December 31, 1935		$ 116.62

15. *Annual Membership. Restricted:*

Balance, January 1, 1935	$ 2,053.84	
Received from dues 1935	4,900.00	
Transferred from Life Membership Account	280.00	
Transferred from Sustaining Membership	349.89	
Miscellaneous Receipts	7.57	$ 7,591.30
Expended	$ 2,116.03	
Transferred to Special Contributions	3,000.00	
Transferred to Special Purposes (Account 21)	58.24	$ 5,174.27
Balance, December 31, 1935		$ 2,417.03

16. *Tuition and Sales. Restricted:*

Balance, January 1, 1935	$ 3,419.54	
Received 1935		
a. Tuitions	2,462.20	
b. Seed Packets	9,893.54	
c. Sales	379.75	
d. Miscellaneous	7.64	$ 16,162.58
Expended	$ 5,340.63	
Transferred to Special Contributions	7,486.75	12,827.38
Balance, December 31, 1935		$ 3,335.20

17. *Botanic Garden Collections Fund. Restricted:*

Balance, January 1, 1935	$ 10.56	
Received from Contributions	5,747.00	$ 5,757.56
Expended	$ 2,278.00	
Transferred to Special Contributions	2,500.00	4,778.00
Balance, December 31, 1935		$ 979.56

18. *Cary Library Fund* ($10,000.00—*1/5 of Income to Brooklyn Botanic Garden*) *Restricted:*

Balance, January 1, 1935	$ .80	
Income Allotment 1935	80.00	$ 80.80
Expended		80.80
		$ 0.00

19. *Henry W. Healy Trust Fund* ($57,994.29) *Restricted:*

Balance, January 1, 1935	$ 15.00	
Income 1935	1,679.00	$ 1,694.00
Transferred to Special Contributions		1,668.00
Balance, December 31, 1935		$ 26.00

20. *Mrs. Henry C. Folger Fund* ($1,000.00) *Restricted:*

Income Account:

Balance, January 1, 1935	$ 40.00	
Income 1935	40.00	$ 80.00
Expended		30.25
Balance, December 31, 1935		$ 49.75

21. *Special Purposes. Restricted by Terms of Gifts:*

Balance, January 1, 1935	$ 2,156.58	
Received:		
a. Special Gifts for Children's Work	89.83	
b. For Endowment of Trees	100.00	
c. Nucleus for a Permanent Fund	150.00	
d. For Publishing "Plants of the Astor Expedition, 1930"	592.22	
e. Chestnut Breeding Project	250.00	
f. Endowment Fund for Children's Work	25.00	
g. For the Local Floral Section	15.00	
h. Transfer from Annual Membership	58.24	
i. " " Endowment Increment Fund	2,091.07	$ 5,527.94
Expended		3,772.62
Balance, December 31, 1935		$ 1,755.32

22. *Plant Pathology Research Fund. Restricted:*

Balance, January 1, 1935	$ 35.78	
Income 1935	6,750.00	$ 6,785.78
Expended	190.80	
Transferred to Special Contributions	6,035.78	6,226.58
Balance, December 31, 1935		$ 559.20

23. *Special Contributions* (for 1935) *Restricted to Personal Service:*

Balance, January 1, 1935	$ 1,502.98	
Miscellaneous	246.48	
Transferred from		
Endowment Fund Income Account	2,020.00	
Alfred T. White Fund Income Account	9,953.65	
A. Augustus Healy Bequest Income Account	391.92	
R. B. Woodward Bequest Income Account	1,000.00	
A. T. White Memorial Tablet Fund Income Account	155.56	
Brooklyn Institute Centennial Fund Income Account	1,200.00	
J. D. Rockefeller, Jr. Fund Income Account	10,025.75	
Citizens Endowment Fund Income Account	10,157.15	
Annual Membership Account	3,000.00	
Tuition and Sales, Public Instruction	600.00	
" " " , Elementary Instruction	6,286.75	
" " " , Sales	600.00	
Collections Fund	2,500.00	
Henry W. Healy Trust Fund	1,668.00	
Plant Pathology Research Fund	6,035.78	
Endowment Increment Fund	2,294.86	$ 59,638.88
Expended for Salaries and Wages		56,645.33
Balance, December 31, 1935		$ 2,993.55

24. *Endowment Increment Fund* ($130,380.94) *Restricted:*

Interest 1935		$ 5,202.56
Expended	$ 500.00	
Transferred to Special Purposes, 25th Anniversary Fund	2,091.07	
Transferred to Special Contributions	2,294.86	
Transferred to Principal	316.63	5,202.56
		$ 0.00

Summary of Private Funds Accounts:

Balances, January 1, 1935	$ 9,609.11	
Income 1935	77,228.76	$ 86,837.87
Expended	$ 74,153.23	
Transferred to Endowment Increment Fund Principal	316.63	74,469.86
Balances, December 31, 1935		$ 12,368.01

III. Summary of Total Maintenance Budget for 1935

Income

Tax Budget Appropriation, 48.7%	$ 82,410.68	
Private Funds Budget, 51.3%	86,837.87	
Total	$169,248.55	
Transferred to Endowment Increment Fund Principal	316.63	$168,931.92

Expended

Personal Service			
Tax Budget	$ 69,085.68		
Private Funds	56,645.33		
Total		$125,731.01	
Other than Personal Service			
Tax Budget	$ 13,287.62		
Private Funds	17,507.90	30,795.52	
Total			156,526.53

Balance, December 31, 1935		
Tax Budget (General Purchase Fund Code Appropriation)	$ 37.38*	
Private Funds	12,368.01	$ 12,405.39

Respectfully submitted,

Daniel C. Downs,

Secretary and Accountant.

Note: The above "Financial Statement" is a transcript of Brooklyn Botanic Garden accounts in the books of the Treasurer of the Brooklyn Institute of Arts and Sciences. The Treasurer's accounts are audited annually by a Public Accountant, and a sepa-

* Unincumbered balances on Tax Budget appropriation are transferred to the General Fund of New York City for the Reduction of Taxes.

rate audit of this "Financial Statement" is not made in order to save unnecessary expense.

EDWIN P. MAYNARD,
Treasurer.

APPENDIX I

GIFTS RECEIVED DURING 1935

Collections Fund

Mrs. Frank L. Babbott
Edward C. Blum
Mrs. Edward C. Blum
Mrs. Armin E. Brunn
Mrs. Glentworth R. Butler
Mrs. S. Parkes Cadman
Mrs. Walter V. Cranford
Dugan Brothers
Miss Adele F. Emerson
Mrs. William Emerson
John W. Frothingham
Mrs. A. Augustus Healy
William T. Hunter
Miss C. Julie M. Husson
Mrs. Stephen Loines
Mrs. Edwin P. Maynard
Mrs. James H. Post
Mrs. Frederic B. Pratt
Harold I. Pratt
William A. Putnam
Mrs. William A. Putnam
J. E. Spingarn
Mrs. Seth Thayer Stewart
Miss Elise W. Stutzer
Mrs. Mary Van Norden
Mrs. Paul E. Vernon
"C. W."
Mrs. R. C. Weithas
Mrs. Alexander M. White
Miss Frances E. White
Miss Harriet H. White
Peter Piper Wright
Miss Abigail Young

For Endowment of Trees

Brooklyn Civic Council	$ 50.00
Girls' Commercial High School	50.00

Nucleus for Permanent Fund

Mr. Clarence L. Hay	$ 50.00
Miss Hilda Loines	100.00

For Publishing "Plants of the Astor Expedition, 1930"

Mr. Vincent Astor	$592.22

Chestnut Breeding Project

American Academy of Arts and Sciences	$250.00

Endowment Fund for Children's Work

Boys' and Girls' Club of Brooklyn Botanic Garden	$ 25.00

Special Gifts for Children's Work

P. S. 117 Queens	$ 10.00
Mrs. Charles E. Perkins	25.00
Mrs. C. I. Debevoise	25.00
Mr. Edward C. Blum	25.00

For the Local Floral Section

Women of '76 Chapter N. S. D. A. R.	$ 15.00

Library

Books

Arai, Mrs. Rioichiro, Riverside, Conn.	1
Baker, Mr. and Mrs. Ray Stannard, Amherst, Mass.	1
Becker, Mr. Herman, Brooklyn, N. Y.	15
Brooklyn Museum Library	5
Brunswick, Master Sanford, Cedarhurst, L. I.	1
Caldwell, Dr. Otis W., Yonkers, N. Y.	2
Carnegie Institution of Washington, Washington, D. C.	1
Chemical Foundation, Inc., New York, N. Y.	1
Evans, Hon. Marcellus H., New York, N. Y.	2
Gager, Dr. C. Stuart, Brooklyn, N. Y.	42
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	1
Gregory, Miss Carrie E., New York, N. Y.	3
Henry, Mrs. J. Norman, Gladwyne, Pa.	1
Land, Master Alfred, Brooklyn, N. Y.	1
Lemée, M. Albert, Brest, France	1
Levine, Miss Roberta, Brooklyn, N. Y.	1
Macfarlane, Dr. John M., Philadelphia, Pa.	1
Mergenthaler Linotype Company, Brooklyn, N. Y.	1
Nebraska State Horticultural Society, Lincoln, Neb.	2
New York State Museum, Albany, N. Y.	1
Sanders, Miss Ethel, Brooklyn, N. Y.	1
Spingarn, Mr. J. E., Amenia, N. Y.	1
Taihoku Imperial University, Formosa, Japan	1
Weiss, Mr. David, Brooklyn, N. Y.	2
Zeller, Miss Louise, Brooklyn, N. Y.	15
Zimmele, Mr. Charles F., Brooklyn, N. Y.	3
Total	107

Pamphlets

American National Red Cross, Washington, D. C. 1
Ames, Professor Oakes, Cambridge, Mass. 1
Bartlett, Professor Harley Harris, Ann Arbor, Mich. 1
Benedict, Dr. Ralph Curtiss, Brooklyn, N. Y. 1
Bissell, Mrs. Ervanna Bowen, Santa Barbara, Cal. 2
Blumer, Mr. George, New Haven, Conn. 1
British Columbia Provincial Library and Archives, Victoria, B. C. 2
Brooklyn Museum Library 4
Caldwell, Dr. Otis W., Yonkers, N. Y. 2
Carnegie Institution of Washington, Washington, D. C. 9
Carnegie Institution of Washington, Dept. of Genetics, Cold Spring Harbor, L. I. 34
Chappel Bros., Inc., Rockford, Ill. 1
Chemical Foundation, Inc., New York, N. Y. 4
Cheney, Dr. Ralph H., Brooklyn, N. Y. 10
Cornell University, Dept. of Plant Pathology, Ithaca, N. Y. 24
Finland. Central Experiment Station, Division of Plant Breeding, Jokionen, Suomi 5
Free, Mr. Montague, Brooklyn, N. Y. 5
Funke, Dr. G. L., Gent, Belgium 11
Gager, Dr. C. Stuart, Brooklyn, N. Y. 132
Garden Club of New Rochelle, N. Y. 1
Hall, Mr. Courtney R., Garden City, L. I. 1
Harper, Dr. Roland M., University, Ala. 2
Henry, Mrs. J. Norman, Gladwyne, Pa. 1
Herb Society of America, Boston, Mass. 2
Ikeno, Professor S., Komaba, Tokyo, Japan 1
Kaiser, Mr. Samuel, Brooklyn, N. Y. 1
Kroeber, Miss Elsbeth, Brooklyn, N. Y. 1
Larsen, Miss Esther Louise, Philadelphia, Pa. 6
Lepeschkin, Dr. W. W., Vienna, Austria 1
Lloyd, Dr. Francis E., Montreal, P. Q. 1
McFarland, Mr. J. Horace, Harrisburg, Pa. 1
Maheshwari, Dr. P., Agra, India 5
Mauritius. Conservator of Forests, Port Louis 2
National Committee on Education by Radio, Washington, D. C. 2
Neumann, Dr. Hugo, Bundesanstalt f. Pflanzenschutz, Vienna, Austria . 1
New York Public Library 2
Nichols Copper Company, New York, N. Y. 2
Nilsson, Professor Heribert, Lund, Sweden 2
Pan American Union, Washington, D. C. 1
Porsild, Dr. Morten P., Disko, Greenland 1
Pritchard, Mr. W. B., Llandudno, Wales 1
Robertson, Mr. R. W., Baltimore, Md. 1
Rockefeller Institute for Medical Research, New York, N. Y. 23

Rothamsted Experiment Station, Harpenden, Herts, Eng.	2
St. John, Dr. Harold, Honolulu, Hawaii	3
Sampson, Dr. H. C., Columbus, O.	1
Sears, Professor Paul B., Norman, Okla.	2
Shanghai Science Institute, Shanghai, China	1
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	6
Spingarn, Mr. J. E., Amenia, N. Y.	2
Stevens, Mr. Edward F., Brooklyn, N. Y.	1
Stoll, Mr. Frank, Brooklyn, N. Y.	2
University Society, Inc., New York, N. Y.	1
Westerdijk, Dr. Johanna, Baarn, Holland	3
Woods, Dr. A. F., Washington, D. C.	1
Young, Dr. Paul A., Bozeman, Mont	2
Zillig, Dr. Hermann, Berncastel-Cues/Mosel, Germany	4
Total	343

Parts of Publications

(Exclusive of Government Documents)

American Horticultural Society, Washington, D. C.	3
American Scenic and Historic Preservation Society, New York, N. Y.	2
American Tree Association, Washington, D. C.	2
Ames, Professor Oakes, Cambridge, Mass.	8
Bailey, Professor L. H., Ithaca, N. Y.	3
Benedict, Dr. Ralph Curtiss, Brooklyn, N. Y.	1
British Columbia. Provincial Museum of Natural History, Victoria	1
Cambridge University, Botanic Garden Syndicate, Cambridge, Eng.	1
Canada. Dept. of the Interior, Forest Service, Ottawa	1
Carnegie Foundation for the Advancement of Teaching, New York, N. Y.	1
Carnegie Institution of Washington, Washington, D. C.	3
Carnegie Museum, Pittsburgh, Pa.	1
Colorado Scientific Society, Denver, Col.	1
Committee on the Relation of Electricity to Agriculture, Chicago, Ill.	1
Conklin, Dr. E. C., Princeton, N. J.	1
Connecticut, Commission of Public Parks, New Haven	1
De La Mare Company, Inc., New York, N. Y.	1
Fisher Scientific Company, Pittsburgh, Pa.	1
Florida Entomological Society, Gainesville, Fla.	3
Flushing Garden Club, Flushing, L. I.	1
Free, Mr. Montague, Brooklyn, N. Y.	13
Gager, Dr. C. Stuart, Brooklyn, N. Y.	38
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	34
Güssow, Dr. H. T., Ottawa, Canada	1
La Hacienda Company, Inc., New York, N. Y.	1

Harvard Forest, Petersham, Mass.	1
Hyde, Mrs. Clarence R., Brooklyn, N. Y.	1
Idaho, University of. Associated Foresters of the School of Forestry, Moscow, Idaho	1
Imperial Bureau of Plant Genetics, Aberystwyth, Wales	1
Jenkins, Mr. Charles F., Germantown, Pa.	4
Junior League of Brooklyn	1
Kenya Colony and Protectorate. Forest Department, Nairobi	1
Liége, Université de, Belgium	1
Medical Society of the County of Kings, Brooklyn, N. Y.	13
Meguro, Imperial Forestry Experiment Station, Tokyo, Japan	1
Mergenthaler Linotype Company, Brooklyn, N. Y.	4
Missouri State Museum, Jefferson City, Mo.	3
Mount Desert Island Biological Laboratory, Salisbury Cove, Me.	1
National Research Council, Washington, D. C.	2
National Research Council of Japan, Tokyo, Japan	1
New Jersey State Horticultural Society, New Brunswick, N. J.	5
New York, Horticultural Society of, Inc.	1
New York Public Library	1
New York State College of Agriculture, Cornell University, Ithaca, N. Y.	13
Ohara Institute for Agricultural Research, Kurashiki, Japan	3
Queensland. Director of Forests, Brisbane, Australia	1
Reed, Dr. George M., Brooklyn, N. Y.	53
Roosevelt Wild Life Forest Experiment Station, Syracuse, N. Y.	1
Rothamsted Experiment Station, Harpenden, Herts, Eng.	1
St. John, Dr. Harold, Honolulu, Hawaii	1
School Garden Association. New York, N. Y.	7
Scientific Expedition to Manchoukuo, Tokyo, Japan	1
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	4
Sociedad Española de Historia Natural, Madrid, Spain	10
Southern Methodist University, Dallas, Texas	2
Taihoku Imperial University, Herbarium, Formosa, Japan	5
Tohoku Imperial University, Sendai, Japan	3
Towson Nurseries, Inc., Towson, Md.	4
Vermont Bureau of Publicity, Montpellier, Vt.	1
Waite Agricultural Research Institute, Glen Osmond, South Australia	1
White, Mr. Richard P., New Brunswick, N. J.	3
Yale University, School of Forestry, New Haven, Conn.	7
Zimmele, Mr. Charles F., Brooklyn, N. Y.	1
Total	289

Portraits and Photographs

Barnhart, Dr. John H., New York, N. Y.	1
Bartlett, Professor Harley Harris, Ann Arbor, Mich.	8
Blumer, Mr. George, New Haven, Conn.	1
Buchholz, Professor John T., Urbana, Ill.	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	1
Hyde, Mrs. Clarence R., Brooklyn, N. Y.	1
Singleton, Dr. W. Ralph, New Haven, Conn.	4
Stevens, Mrs. Frank Lincoln, Urbana, Ill.	1
Winogradsky, Professor S. N., Brie-Comte-Robert, France	1
Total	19

Autograph Letters

Gager, Dr. C. Stuart, Brooklyn, N. Y.	11
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	1
Total	12

Miscellaneous

Gager, Dr. C. Stuart, Brooklyn, N. Y. 2 Obituary cards
1 Folder of watercolor drawings

For the Department of Plants

Living Plants

Becker, Mr. Herman, Brooklyn, N. Y., 13 species of succulent plants.
Bernhardt, Dr. A., Brooklyn, N. Y., 8 plants, in 4 varieties.
Bobbink & Atkins, Rutherford, N. J., 210 roses in 56 varieties.
Borsch, Wm. & Son, Inc., Maplewood, Oregon, 18 plants comprising 14 species and varieties of rock garden plants.
Brakkee, Mr. Harry F., Brooklyn, N. Y., 1 *Clivia miniata.*
Bullard, Mr. Howard O., Hackensack, N. J., 158 cacti in approximately 83 species.
Cedar Hills Nursey, Brookville, L. I., 26 plants comprising 25 varieties of *Syringa.*
Clark, Mr. Orton L., Amherst, Mass., 6 seedlings of *Dirca palustris.*
Coleman, Miss L. M., Brooklyn, N. Y., 1 plant of pink-flowered lily-of-the-valley.
Conard-Pyle Co., West Grove, Pa., 19 roses in 6 varieties.
Cumming, Alex. Bristol Nurseries, Bristol, Conn., 450 plants of Korean chrysanthemums, in 6 varieties.
Currie, Dr. James N., Brooklyn, 1 large clump of *Cypripedium hirsutum.*
Dahliadel Nurseries, Vineland, N. J., 112 dahlia plants in 38 varieties.

Dillman, Mr. George, New York City, 11 plants of *Viola* in 3 species.
Guest, Mr. A. R., Brooklyn, N. Y., 6 plants of 3 local flora species.
Hanks, Miss L. T., Brooklyn, N. Y., 1 *Chrysanthemum balsamita tanacetoides.*
Hayward, Mr. Wyndham, Winter Park, Florida, 2 bulbs *Zephyranthes* sp.
Hecht, Miss Sadie, New York City, 6 seedlings of winter flowering marigold.
Jackson & Perkins Co., Newark, Wayne Co., N. Y., 30 rose plants in 5 varieties.
Johnson, Mrs., Brooklyn, N. Y., 1 *Aloe arborescens.*
Kelley, Mrs. H. A., Saint Remy, N. Y., 1 *Athyrium angustum rubellum.*
King, Miss Katherine C., Brooklyn, N. Y., 1 *Eucharis amazonica.*
Kruelski, Mr. Edward, Brooklyn, N. Y., 5 species of Long Island plants.
Lorenz, Mr. C., Wise, N. C., 1 *Dionaea muscipula.*
Manley, Dr. Mark, Brooklyn, N. Y., 1 *Tillandsia* species.
Marsh, Mr. Spencer, Madison, N. J., 3 *Thelypteris Goldiana,* 1 *Evonymus obovatus.*
Merrill, Mr. Whitney, Brooklyn, N. Y., 2 *Epigaea repens,* 1 *Houstonia caerulea.*
Norwig, Mr. J., Brooklyn, N. Y., 3 species of succulent plants.
Oxford Paper Co., Rumford, Me., 10 cuttings each of 10 varieties of *Populus.*
Peavey, Mr. R. W., Brooklyn, N. Y., 1 *Amorphophallus Rivieri.*
Prescott, Mr. Otto, Brooklyn, N. Y., 1 species of *Ficus.*
St. John, Mr. R. P., Bluff Point, N. Y., 50 *Azolla caroliniana.*
Sharps, Mr. J., Newbury, N. H., 1 *Gentiana sino-ornata.*
Smith, Dr. D. C., Oregon Agr. Exp. Sta., Corvallis, 19 cuttings of 4 types of *Humulus Lupulus.*
Steckler, Mr. Peter, Tucson, Ariz., 123 cacti in 29 species.
Tricker, Wm., Inc., Saddle River, N. J., 38 plants comprising 37 species and varieties of water lilies.
Urban, Mrs. Edith, Brooklyn, N. Y., 25 *Viola* species.
Waller, Mr. Adolph, Ohio State Univ., Columbus, 1 *Helianthus Kellermani.*
Wherry, Dr. Edgar T., University of Pennsylvania, Philadelphia, 3 *Thelypteris spinulosum* var. *fructuosum.*
Wister, Mr. John C., Germantown, Phila., 47 plants comprising 38 species and varieties of *Syringa.*
Worth, Dr. C. R., Groton, N. Y., 1 *Parochaetus communis,* 3 *Aster linariifolius.*
Young, Mr. W. J., West Point, N. Y., 3 *Aster linariifolius.*

Seed Packets

Mrs. W. Archibald (10)
Blaksley Botanic Garden (3)
Mrs. Otilia A. Brockaway (1)
Dr. Leon Croizat (2)
Mrs. Gertrude Daniels (1)
Miss Perley B. Davis (1)
Mr. John A. Grant (1)
Mr. Wyndham Hayward (5)
Dr. Homer D. House (2)
Mr. Wm. L. Hunt (1)
Mrs. Clarence R. Hyde (1)
Mr. Robert B. Job (1)
Miss Hilda Loines (1)
Mr. Edward K. Macrum (1)
Mr. James McKee (6)
Mr. E. Percy Phillips (1)
Dr. Kaiji Sawa (2)
Fr. Marie-Victorin (1)
Dr. C. R. Worth (1)

Phanerogamic Herbarium

Coombs, Mrs. Jerome W., 160 specimens collected by Mrs. Coombs in South Africa.

Daniels, Mrs. Gertrude, 1 specimen of cultivated *Cosmos*.

Drushel, Dr. J. A., 73 specimens collected by Dr. Drushel in the eastern and southern United States.

Hanmer, Mr. Charles C., 655 specimens from Connecticut and adjacent territory, being the collection of H. S. Clark.

Kittredge, Miss E. M., 36 specimens from Vermont.

Provost, Miss E. M., 1 specimen of *Sabatia* from Virginia; 1 *Ornithogalum thyrsoides* from Natal.

St. John, Mr. Robert P., 21 ferns from Florida.

Cryptogamic Herbarium

Studhalter, Dr. R. A., Texas Technological College, Lubrock, Texas, 1 specimen of *Riella americana*.

For the Department of Elementary Instruction

Bartlett, Mr. H. Noble, Six outline maps of the children's garden.

Blum, Mr. Edward C., $25.00 for the children's clubroom.

Boys and Girls Club, $25.00 to be used as a nucleus for an Endowment Fund for the Children's Work.

Brunswick, Master Sanford, One book for the children's clubroom library.

Butler, Mrs. Glentworth R., One subscription to the Nature Magazine for the children's clubroom library. One prize cup competed for by the girls in the outdoor garden.

Church & Dwight Company, Inc., Two bird charts and pictures for use in classwork.

DeBevoise, Mrs. C. I., $25.00 for the children's work.

Dennis, Miss Marguerite, One vase for the children's garden house.

Gager, Dr. C. Stuart, Three books for the children's garden library.

Garden Teachers' Association, One prize cup competed for by the students of the outdoor garden.
Goodman, Mr. and Mrs. Joseph, One cup competed for by the boys in the outdoor garden.
Gregory, Miss Carrie E., Two books for the children's garden library. One book for the children's clubroom library.
Land, Master Alfred, One book for the children's clubroom library.
Levine, Miss Roberta, One book for the children's clubroom library.
Lewis, Mr. M., Four dahlia tubers for the children's garden.
Loines, Mrs. Stephen, One pink amaryllis bulb.
Perkins, Mrs. Charles E., $25.00 honorarium for children's garden work.
Public School 117, Queens, Parent-Teachers Association, $10.00 for the children's work.
Sanders, Miss Ethel, One book for the children's clubroom library.
Shaw, Miss Ellen Eddy, Two gold honor pins for service in the outdoor garden.
Snedeker, Mrs. Edwin L., One and a half dozen hollyhock plants, four clumps of lily-of-the-valley, and seeds of Mexican sunflower for the children's garden.
South Carolina Experiment Station, One bag of cotton seed for use in classwork.
Spollen, Miss Patricia, One vase for the children's garden house.
Weiss, Mr. David, One book for the children's garden house.
Woodward, Miss Ethel V., Cuttings of various Southern plants and nature material for classwork.

Miscellaneous

Mr. Henri Bernhey, Brooklyn, 7 photographs taken in Brooklyn Botanic Garden.
Mrs. J. A. Birdsall, Brooklyn, 1 Terrarium.
Mr. Ernest Flagg, New York City, 4 loads of serpentine stone for Local Flora Section.
Mrs. Clarence R. Hyde, Brooklyn, 14 photographs of old trees in Connecticut.
Mattfeld, Dr. Johannes, Botanischer Garten & Museum, Berlin-Dahlem, Germany, one photograph of the type of *Eleocharis vivipara* Link.
Miss Ellen Eddy Shaw, Brooklyn, 2 photographs of views in Japanese Garden.
Spencer Lens Co., Buffalo, New York, 1 microscope wall chart.
Mr. Peter Steckler, Tucson, Arizona, 42 live horned toads.
Miss Helen M. Tillinghast, South Hadley, Massachusetts, 1 box gourds.

APPENDIX 2

PUBLICATIONS BY THE BOTANIC GARDEN PERSONNEL DURING 1935

Benedict, Ralph C.

The cultural value of biology in secondary schools. *The Teaching Biologist* **4**: 45–48. February.

Report of the Resident Investigator (Ferns) for 1934. *Brooklyn Bot. Gard. Record* **24**: 110–111. April.

Review: Alston, A. H. G. Pteridophyta of Antigua. (*Jour. Bot. Brit. & For.* **73**: 33–40. Feb. 1935.) *Amer. Fern Jour.* **25**: 132. October–December.

Review: Alston, A. H. G. Mr. John Gossweiler's plants from Angola and Portugese Congo. (*Jour. Bot. Brit. & For.* **72**: 1–8. Supplement. Sept. 1934.) *Amer. Fern Jour.* **25**: 132–133. October–December.

Review: Raunkiaer, C. On the significance of Cryptogams for characterizing plant climates. (*The Life Forms of Plants.* Clarendon Press, Oxford, 1934.) *Amer. Fern Jour.* **25**: 133–135. October–December.

Discussion: Comments on articles. *The Teaching Biologist* **5**: 32 and 35. November.

Cheney, Ralph H.

Comparative effect of caffeine per se and a caffeine beverage (coffee) upon the reaction time in normal young adults. *Jour. Pharmacol. and Exper. Therap.* **53**: 304–313. March.

Ventricular response in caffeine-nicotine antagonism. *Jour. Pharmacol. and Exper. Therap.* **54**: 42–52. May.

Cardiac automaticity effects of caffeine and nicotine.

I. Caffeine influence upon the response of the sino-auricular strip. *Jour. Pharmacol. and Exper. Therap.* **54**: 213–221. June.

II. Nicotine influence upon the response of the sino-auricular strip. *Jour. Pharmacol. and Exper. Therap.* **54**: 222–229. June.

III. Caffeine-nicotine antagonism in sino-auricular strip response. *Jour. Pharmacol. and Exper. Therap.* **54**: 230–235. June.

Cardiac automaticity effects of caffeine and nicotine. *Jour. Nerv. and Mental Disease* **82**: 575. November.

Chichester, Emilie Perpall (with C. Stuart Gager)
Books and manuscripts illustrating the history of botany. *Brooklyn Bot. Gard. Record* **24**: 159–182. July.

Free, Montague
The care of a winter garden indoors. *Southern Home and Garden.* January.
Berries and branches as decorative material. *Bulletin of the City Gardens Club.* January.
The Brooklyn Botanic Garden exhibit of garden operations at the Twenty-second International Flower Show, March 18–23. *Brooklyn Bot. Gard. Leaflets* **XXIII**[1]. March 13.
Report of the Horticulturist and Head Gardener for 1934. *Brooklyn Bot. Gard. Record* **24**: 95–102. April.
Aquatic gardening. *New York Sun.* June 1.
Planting the rock garden. *Florists Exchange* **84**: 19. June 8.
Charms of the lesser bulbs. *New York Sun.* Sept. 21.
Fall planting in the rock garden. *New York Times.* Sept. 22.
A rock garden pilgrimage. *Gardeners Chronicle* **30**: 311 and 317. October.
Rock gardens. *House Beautiful.* December.

Gager, C. Stuart
Twenty-fourth annual report of the Brooklyn Botanic Garden, 1934: Report of the Director. *Brooklyn Bot. Gard. Record.* **24**: 11–49. April.
Effects of Radium Rays on Living Cells. *Science.* **82**: 327. Oct. 4.

Gager, C. Stuart and Emilie Perpall Chichester
Books and manuscripts illustrating the history of botany. *Brooklyn Bot. Gard. Record* **24**: 159–182. July.

Graves, Arthur Harmount
The care of cut flowers. *Brooklyn Bot. Gard. Leaflets* **XXIII**[2-3]: 1–8. March.
Botany. *Revision service (for 1934), Collier's National Encyclopedia,* pp. 16–17. April.

Forest Pathology. Chestnut breeding work in 1934. *Brooklyn Bot. Gard. Record* **24**: 59–65. April.

Report of the Curator of Public Instruction for 1934. *Brooklyn Bot. Gard. Record* **24**: 72–80. April.

36 newspaper articles relating to the Brooklyn Botanic Garden.

2 abstracts in *Biological Abstracts*.

Gundersen, Alfred

Report of the Curator of Plants for 1934. *Brooklyn Bot. Gard. Record* **24**: 85–89. April.

Characteristics of Families of Dicotyledons Except Sympetalae. *Brooklyn Bot. Gard. Leaflets* XXIII[5]. December.

Reed, Geroge M.

Plant Pathology. *Brooklyn Bot. Gard. Record* **24**: 50–58. April.

Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag oats. *Bull. Torrey Club* **62**: 177–186. April.

Physiologic specialization of the parasitic fungi. *Bot. Rev.* **1**: 119–137. April.

Shaw, Ellen Eddy

Report of the Curator of Elementary Instruction. *Brooklyn Bot. Gard. Record* **24**: 80–85. April.

Indoor gardens. *Amer. Jour. of Nursing* **35**: 1009–1011. November.

The following 37 articles appeared in *The Sun* (New York) on the dates indicated:

Seed novelties of 1935. February 2.

More seed novelties of 1935. February 9.

Starting seed. February 16.

Novelties of 1934. February 23.

A good lawn. March 2.

The perennial border. March 9.

Starting seed of begonias, geraniums, and other novelties. March 16.

Annuals. March 23.

Tools and equipment for the garden. March 30.

The small vegetable garden. April 6.

Lilies for the garden. April 13.
Color in the garden. April 20.
Box gardens for windows, roofs, and porches. April 27.
Vines. May 4.
Ho, ho, Junior Gardeners! May 11.
Garden care. May 18.
Still time to make a garden. May 25.
Wayside planting. June 1.
Garden friends. June 8.
Care of the lawn. June 15.
Studying your garden. June 22.
Our common weeds. July 6.
Stories of some of our common vegetables. July 13.
Stories of some of our common flowers. July 20.
Starting perennials from seed. July 27.
Choose shrubs for continuous bloom. August 3.
To the Juniors. August 10.
Aristocrats among the evergreens. August 17.
Choosing bulbs for spring bloom. August 24.
More about bulb planting. August 31.
Trees for your yard. September 7.
House plants for indoor culture. September 14.
What to plant in the fall. September 28.
Fall planting of roses. October 5.
Lilies for fall planting. October 12.
Bulbs for indoor culture. October 19.
Other simple methods of plant propagation. October 26.

Svenson, Henry K.

Ferns. *Garden Club Amer. Bull.* **13** (5th Series): 101–104. January.

Plants of the Astor Expedition, 1930. *Amer. Journ. Bot.* **22**: 208–277. 9 pl. February.

Plants of the Astor Expedition, 1930. *Brooklyn Bot. Gard. Contributions.* No. 69 (Reprint). February.

Report of the Associate Curator of Plants for 1934. *Brooklyn Bot Gard. Record* **24**: 89–95. April.

Review: Gleason, H. A. Plants of the Vicinity of New York. *Torreya* **35**: 68–70. May–June.

Aster patens Ait. forma rosea, f. nova. *Rhodora* **37**: 263. July.

Tillaea aquatica on Long Island. *Rhodora* **37**: 301. August.

Listera australis on Long Island. *Rhodora* **37**: 308. August.

Plants from the Estuary of the Hudson River. *Torreya* **35**: 117–125. 1 fig. September–October.

Preparation of Herbarium Specimens. *Brooklyn Bot. Gard. Leaflets* **XXIII**[4]. November.

Another New Jersey Station for Najas gracillima. *Rhodora* **37**: 414. November.

Viola rotundifolia on Long Island. *Rhodora* **37**: 421. December.

Svenson, Henry K. and Ludlow Griscom

Isoetes macrospora in the Shenandoah Valley. *Amer. Fern Jour.* **25**: 70–71. April–June.

Tilley, S. R.

Garden paths. *Gardener's Chronicle of America* **39**[2]: 34. February.

APPENDIX 3

TALKS, LECTURES, ADDRESSES, AND PAPERS GIVEN BY THE BOTANIC GARDEN PERSONNEL DURING 1935

By the Director:

March 29. *Modern trends in education.* Adelphi College Trustees, Faculty, and Alumni. Garden City, L. I.

May 13. *Address* at the Commemoration Program of the 25th Anniversary Exercises of the Brooklyn Botanic Garden. At the Garden.

May 14. *The Botanic Garden and the City.* Remarks in accepting a Horsechestnut tree (*Aesculus Hippocastanum*), presented to Brooklyn Botanic Garden by the Brooklyn Civic Council in Honor of Hon. Lewis H. Pounds, former President of the Borough of Brooklyn and Chairman of the Civic Council. At the Garden.

June 13. *The neighborliness of institutions.* Remarks in accepting a Horsechestnut tree (*Aesculus Hippocastanum* var.

Baumannii), presented by the Girls Commercial High School in recognition of the 25th Anniversary of the Botanic Garden. At the Garden.

October 8. *What the Brooklyn Botanic Garden means to Brooklyn.* Dutch Church Men's Club. Brooklyn.

October 31. *The greatest scientific discovery.* The Sigma Xi Club. Massachusetts State College. Amherst.

October 31. *Botany serving the public.* Student Assembly Massachusetts State College, Amherst. (Given twice.)

December 4. *The economic and cultural value of botanical research.* Student Assembly, Polytechnic Institute of Brooklyn.

By the Curator of Public Instruction:

Jan. 4. *The work of leaves: autumn colors.* Washington Irving High School. Manhattan. 2 talks.

Feb. 28. *The plant and animal kingdoms.* Students from St. Barbara High School. At the Garden.

March 20. *Forestry and conservation.* American Museum of Natural History.

May 1. *Forestry and conservation.* Seward Park High School Assembly. Arbor Day celebration.

May 28. *Chestnut breeding.* Group of 200 pupils from Grover Cleveland High School. At the Garden.

July 25. *The work of the Brooklyn Botanic Garden.* Group from New York University Summer School. At the Garden.

Oct. 9. *Some European parks and botanic gardens.* Brooklyn Institute, Department of Botany. At the Garden.

Nov. 16. *Some European parks and botanic gardens.* Hartford Chapter, Appalachian Mountain Club. Hartford, Conn.

Nov. 21. *Our native trees in the winter condition.* Brooklyn Nature Club.

By the Curator of Elementary Instruction:

January 7. *The soil.* Little Garden Club of Greenwich Village.

January 16. *Nature stories for boys and girls.* Primary Grades, New York Ethical Culture School.

January 23. *Plant life.* P. S. 184.
January 25. *Graduation address.* P. S. 241.
January 29. *Graduation address.* P. S. 233.
March 4. *Desert gardens.* Central Garden Club of Brooklyn.
March 6. *The small garden.* Mothers' Club, P. S. 134 Queens.
March 12. *Plants that give us our beverages.* P. S. 150.
March 15. *Anniversary address.* Girls' Commercial High School.
March 19. *Children's garden work.* National Advisory Board, Junior Garden Clubs of America. At the Waldorf-Astoria.
March 29. *Children's garden work.* Officers of Garden Clubs. At the Garden.
April 2. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 47. At the Garden.
April 2. *Gardening for children.* Wilde Open Air School.
April 3. *Nature study for the first four grades.* First Grade Organization of Mount Vernon Schools, Mount Vernon, N. Y.
April 9. *Plant propagation.* Garden Department, North County Home Association, East Norwich, Long Island.
April 10. *Rice and sugar.* Fifth year assembly, P. S. 156.
April 10. *South American plant products.* Sixth year assembly, P. S. 156.
April 11. *Children's gardens.* Bay Shore Garden Club, Bay Shore, Long Island.
April 15. *Rice.* Two assemblies, P. S. 155, Queens.
April 24. *Gardening for boys and girls.* Connecticut Federation of Garden Clubs, Milford, Conn.
April 30. *Educational activities at the Brooklyn Botanic Garden.* Mothers' Club, P. S. 225. At the Garden.
May 3. *Arbor Day.* P. S. 174.
May 3. *Arbor Day.* P. S. 172.
May 6. *Little gardens.* Union Church of Bay Ridge, Brooklyn.
May 8. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 44. At the Garden.
May 10. *Nature study for boys and girls.* Two assemblies, P. S. 185.

May 20. *Plant work for children.* Association of Home Making Teachers of the New York City Schools, Manhattan.

May 23. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 140. At the Garden.

May 28. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 24. At the Garden.

June 5. *Gardening for boys and girls.* Great Neck, L. I., Flower Show.

October 1. *Gardens for boys and girls.* Brooklyn Home for Consumptives.

October 5. *Educational work for children at the Brooklyn Botanic Garden.* Class in Education from New York University. At the Garden.

October 9. *House plants.* Class from the American Museum of Natural History. At the Garden.

October 16. *The Brooklyn Botanic Garden.* Group of Mothers from P. S. 186. At the Garden.

October 21. *The Brooklyn Botanic Garden.* P. S. 155, Queens.

November 6. *Educational activities of the Brooklyn Botanic Garden.* Woman's Alliance, Presbyterian Church, Hollis, L. I.

November 12. *Plant nature study for first, second, and third grades.* Teachers of East Orange, N. J.

November 13. *Education of today.* Parents' Association, P. S. 233.

November 15. *The history of the Brooklyn Botanic Garden.* Junior League of Brooklyn. At the Garden.

November 18. *Nature study in the fall.* Mothers' Club, P. S. 241.

November 20. *Plant study for elementary schools.* Delegates of School Districts 51 and 52, Queens. P. S. 82, Queens, L. I.

November 27. *Thanksgiving.* Two assemblies, Girls' High School.

December 2. *The work of the Brooklyn Botanic Garden.* Association of Home Making Teachers of the New York City Schools. At the Garden.

December 9. *Plant nature study for the fourth, fifth, and sixth grades.* Teachers of East Orange, N. J.

By the Curator of Plant Pathology:

February 13. *Breeding and inheritance in plants.* Department of Botany, Brooklyn Institute of Arts and Sciences. At the Garden.

April 27. *Japanese gardens.* Reconciliation Trips. At the Garden.

June 5. *The gardens of Japan.* Woman's League, Ocean Avenue Congregational Church, Brooklyn.

By the Curator of Plants:

January 9. *Plant and animal evolution—their interdependence.* Brooklyn Institute, Department of Botany. At the Garden.

March 30. *Stellar and organic evolution compared.* Department of Astronomy of the Brooklyn Institute. Brooklyn Academy of Music.

May 7. *Interdependence in plant and animal evolution.* Department of Biology of Drew University. At the Garden.

By the Curator of the Herbarium:

April 15. *Native plants.* Boy Scouts of Bethlehem Lutheran Church. Brooklyn.

April 17. *The Bidens problem in Eastern New York.* Torrey Bot. Club. At the Garden.

May 26. *Plants and animals of the Galapagos Islands.* Joint conference of the American Fern Society, the Brooklyn Botanic Garden and the New York Association of Biology Teachers. Branchville, N. J.

December 3. *What is a species?* Biology Club of Hunter College. Hunter College, New York City.

By the Horticulturist:

February 5. *Plant propagation.* Woman's Auxiliary of the Brooklyn Botanic Garden. At the Garden.

February 26. *Trees, shrubs, and evergreens.* Gardening course. New York Herald-Tribune.

May 17. *President's remarks.* Annual Meeting, American Rock Garden Society. Cincinnati.

May 17. *Plants for the rock garden.* Annual Meeting, American Rock Garden Society. Cincinnati.
May 22. *Rock gardening.* Broadmoor Garden Club. Colorado Springs.
June 17. *Random musings of a roving gardener.* California Horticultural Society, San Francisco.
June 27. *The value of botanic gardens.* Arboretum Foundation of the University of Washington. Seattle.
June 28. *The future of rock gardening.* Washington Region of the American Rock Garden Society. Seattle.
August 19. *Garden problems.* Belle Terre (L. I.) Garden Club.
September 18. *Bulbs.* North Country Garden Club, Glen Head, L. I.
October 8. *Rose culture under city conditions.* Rose Garden Day. At the Garden.
November 12. *House plants.* Fairfield (Conn.) Garden Club.
December 4. *Standards.* Garden Club of America. New York City.

By Instructors:

Miss Dorward:

January 10. *Making a terrarium.* Garden Study Group, Cedarhurst, L. I.

Miss Hammond:

March 18. *The little garden.* Mothers' Club, P. S. 128, Queens, L. I.
April 3. *Window box gardening.* Central Branch, Y. W. C. A., Brooklyn.
April 10. *The little garden.* Mothers' Club, P. S. 107.
April 23. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 134, Queens, L. I. At the Garden.
May 2. *Gardening in the city.* Mothers' Club, P. S. 137.
May 21. *The Local Flora Section of the Brooklyn Botanic Garden.* Brooklyn Section, Public School Kindergarten Association. At the Garden.

Miss Miner:

April 11. *Children's gardening.* Busy Junior Garden Club, Floral Park-Bellerose School. Bellerose, L. I.

April 20. *The children's garden at the Brooklyn Botanic Garden.* Junior Sunshine Garden Club. Stewart Manor, L. I.

August 19. *Making terraria.* Bay Ridge Garden Club, Bay Ridge, Brooklyn.

By the Resident Investigator (Ferns):

September 9. *Ferns.* Glens Falls (N. Y.) Garden Club.

December 9. *Genes and education.* Monthly Teachers Conference, Abraham Lincoln High School.

December 13. *Selection and presentation of subject matter for seventh, eighth and ninth year science, from the biological point of view.* General Science Ass'n of N. Y. Teachers College (Columbia University).

By the Resident Investigator (Economic Plants):

February 19. *Is coffee harmful? (The history of the plant and the beverage.)* New York City Chapter of P. E. O.

By the Custodian:

February 28. *Winter identification of trees.* Brooklyn Nature Club.

By the Foreman Gardener (Bishop, George R.):

March 8. *Plant propagation.* Men's Club of the Bedford Park Presbyterian Church. Bronx, New York City.

By the Field Secretary:

January 21. *Flower arrangement.* Bay Ridge Garden Club.

March 25. *Brooklyn Botanic Garden and its activities.* Woman's Club of Jackson Heights. At the Garden.

April 1. *Flower Arrangement.* Brooklyn Junior League meeting. Hotel Bossert.

April 22. *Brooklyn Botanic Garden.* Woman's Auxiliary of Flatbush Congregational Church. At the Church.

April 26. *Brooklyn Botanic Garden and its activities.* Fortnightly Club. At the Garden.

May 2. *The Brooklyn Botanic Garden and its activities.* Far Rockaway Woman's Club. At the Garden.

May 4. *Brooklyn Botanic Garden and its activities.* 8th District Jersey Federation of Women's Clubs.

May 28. *Brooklyn Botanic Garden and its activities.* Mothers Club of Vanderveer M. E. Church. At the Garden.
May 29. *Brooklyn Botanic Garden and its activities.* Woman's Society Parkside Baptist Church. At the Garden.
September 16. *Brooklyn Botanic Garden and its activities.* Garden Dept. Mothers Club. Lynbrook, L. I.
October 8. *Brooklyn Botanic Garden and its activities.* Lynbrook Mothers Club. At the Garden.
October 11. *Brooklyn Botanic Garden and the Shakespeare Garden flowers mentioned in Shakespeare's writings.* Shakespeare Club of Brooklyn. At the Garden.
October 28. *Courses at Brooklyn Botanic Garden.* II District meeting of Federation of Garden Clubs (43). Farmingdale, L. I.
November 18. *Brooklyn Botanic Garden and its activities.* Woodmere Garden Club. At the Garden.
November 21. *Brooklyn Botanic Garden and its activities.* Colonia Club. At the Garden.
November 25. *New views of the Brooklyn Botanic Garden and making a dish garden; Demonstration.* Monday Culture Charity Club. At the Garden.

APPENDIX 4

RADIO TALKS BY THE BOTANIC GARDEN PERSONNEL DURING 1935

By the Horticulturist:

From Station WOR:

January 14. Fun with house plants.
February 25. More fun with house plants.
April 19. Easter plants and their significance.
July 26. Summer pruning.
August 23. Small shrubs for rock gardens.
September 23. Keeping cut flowers fresh.
October 14. The hibernation of tender tubers.
November 15. House plants—Killing them with kindness.
December 31. Winter pruning.

From Station WNYC:

January 24. Terraria.
March 7. Getting ready for spring planting.
April 18. Planting annuals.
October 24. Carrying plants over the winter.
December 5. Garden books.

From Station WMCA:

March 22. The Brooklyn Botanic Garden Exhibit at the International Flower Show, New York City.

By the Curator of Public Instruction (Station WNYC)

From Station WNYC:

January 10. Breeding new chestnut trees by the Brooklyn Botanic Garden.
February 21. The care of cut flowers.
April 4. Spring flowers at the Brooklyn Botanic Garden.
May 16. What to see at the Brooklyn Botanic Garden.
November 7. What to see now at the Brooklyn Botanic Garden.
December 19. Making a new chestnut tree.

By the Curator of Elementary Instruction:

From Station WEAF:

June 7. Fun in the outdoors for boys and girls.

From Station WNYC:

February 7. Seed novelties for 1935.
March 21. Planning and preparing the garden.
November 21. Plants for the home.

From Station WOR:

March 11. The origin of our common garden flowers.
May 24. City backyards.
June 10. Our common weeds.

APPENDIX 5

FIELD TRIPS CONDUCTED

By the Curator of the Herbarium:

April 14. Field meeting of the Newark Museum Nature Club. At the Garden.

April 20. Field meeting of the Torrey Botanical Club. At the Garden.

May 24–26. Joint conference of the American Fern Society, the Brooklyn Botanic Garden and the New York Association of Biology Teachers. At Branchville, N. J. (With Dr. R. C. Benedict.)

September 15. American Fern Society. To Springdale, N. J. (With Dr. R. C. Benedict.)

By the Curator of Plants:

October 6. Torrey Botanical Club. Trip to Dunderberg Mountain.

By the Resident Investigator (Ferns):

May 24–26. American Fern Society—Torrey Botanical Club. Branchville, New Jersey.

September 15. American Fern Society—Torrey Botanical Club. Springdale, New Jersey.

APPENDIX 6

MEETINGS OF ORGANIZATIONS AT THE GARDEN 1935

January	9.	Department of Botany, Brooklyn Institute of Arts and Sciences.
February	13.	Department of Botany, Brooklyn Institute of Arts and Sciences.
March	13.	Department of Botany, Brooklyn Institute of Arts and Sciences.
	25.	Jackson Heights College Women's Club.
	25.	Monday Culture Charity Club.
April	2.	Mothers' Club, P. S. 47.

	10.	Department of Botany, Brooklyn Institute of Arts and Sciences.
	17.	Torrey Botanical Club.
	18.	Contemporary Club.
	23.	Mothers' Club, P. S. 134, Queens.
	26.	Fortnightly Library Club of Brooklyn.
	30.	Mothers' Club, P. S. 225.
May	1.	Women of '76 Chapter, N. S. D. A. R.
	4.	Garden Department of the 8th District, New Jersey Federation of Garden Clubs.
	7.	Brotherhood, Drew Theological Seminary, Madison, New Jersey.
	8.	Valley Garden Club, Spring Valley, New York.
	8.	Kindergarten Mothers' Club, P. S. 44.
	21.	Brooklyn Section, New York Public School Kindergarten Association.
	28.	Mothers' Club, P. S. 24.
	28.	Mothers' Club, Vanderveer M. E. Church.
	29.	Women's Society, Lenox Road Baptist Church.
September	11.	American Rock Garden Society.
October	8.	Lynbrook Garden Club.
	9.	Department of Botany, Brooklyn Institute of Arts and Sciences.
	11.	Brooklyn Shakespeare Club.
	21.	New Jersey Federation of Women's Clubs.
November	6.	Department of Botany, Brooklyn Institute of Arts and Sciences.
	18.	Woodmere Garden Club.
	21.	Colonia Club.
	25.	Monday Culture Charity Club.
December	4.	Department of Botany, Brooklyn Institute of Arts and Sciences.

	1931	1932	1933	1934	1935
Number of organizations.....	23	59	49	48	31
Total attendance.....	1146	2741	3357	1906	839

APPENDIX 7

REPORT ON PHOTOGRAPHIC WORK

Negatives on file December 31, 1934	8,703
Negatives accessioned during 1935	191
Total negatives on file December 31, 1935	8,894
Lantern slides on file December 31, 1934	6,185
Lantern slides accessioned during 1935	63
Total lantern slides on file December 31, 1935	6,248
Prints on file December 31, 1934	6,079
Prints made during 1935	922
Used or distributed	731
Prints filed during 1935	191
Total prints on file December 31, 1935	6,270
Enlargements made	113

Respectfully submitted,

FRANK STOLL,
Registrar.

APPENDIX 8

REPORT ON BROOKLYN BOTANIC GARDEN PUBLICATIONS, 1935

American Journal of Botany

Official Organ of the Botanical Society of America

Volume XXII (1935) comprised, as usual, ten monthly issues (omitting August and September), with 66 papers, 936 pages, 69 plates, and 372 text figures (as against 58 papers, 728 pages, 20 plates and 341 text figures in 1934). Dr. Arthur Harmount Graves continued on the editorial board as representative of the Brooklyn Botanic Garden. Professor Sam F. Trelease, of Columbia University, continued as Editor-in-Chief.

The circulation at the close of the fiscal year (November 30, 1935) was 1,561 as against 1,569 one year ago. The annual budget was $10,810.44 as against $13,194.69 in 1934. The year closed with a credit balance of $964.83 and assets over liabilities of $3,117.59 plus the value of back sets and volumes on hand. Their advertised sales value is $37,202.

Ecology

Official Organ of the Ecological Society of America

Quarterly. Volume XVI comprised 51 papers (besides reviews, proceedings, and miscellaneous matter), 680 pages and 175 text figures (as against 36 papers, 456 pages and 95 text figures in 1934). The circulation at the close of the fiscal year (November 30, 1935) was 1,009 as against 987 one year ago.

The annual budget was $6,364.34, the credit balance $1,229.22 and assets over liabilities $1,368.21 (as against $5,021.12, $1,688.90 and $1,727.97 assets over liabilities in 1934) plus the value of back sets and volumes on hand. Dr. Henry K. Svenson continued on the editorial board as the Brooklyn Botanic Garden representative. Prof. Alfred E. Emerson and Prof. George D. Fuller, both of the University of Chicago, continued as Editors.

Genetics

In Co-operation with the Editorial Board of Genetics

Bimonthly. Volume XX comprised 39 papers, 604 pages, 4 plates, and 215 text figures (as against 35 papers, 634 pages, 9 plates, and 75 text figures in 1934). At the close of the fiscal year (November 30, 1935) the circulation was 701, the annual budget $9,022.84, and the credit balance $3,707.08 (as against 680, $9,260.49, and $3,774.18 in 1934), plus the value of back sets and volumes on hand. Dr. Donald F. Jones, Connecticut Agricultural Experiment Station, continued as Managing Editor until December 1 when he was succeeded by Dr. L. C. Dunn of Columbia University.

Brooklyn Botanic Garden Record

Quarterly. Volume XXIV comprised 228 pages. The April number comprised the Annual Report. The circulation of the Record at the close of the year was 1,510.

Leaflets

Three single numbers and one double number were issued. The circulation as of December was 1,697.

Contributions and *Memoirs*

Numbers 69, 70, and 71 of the Contributions were published. No Memoir was published.

APPENDIX 9

AMERICAN JOURNAL OF BOTANY AND THE BROOKLYN BOTANIC GARDEN

During 1935 the following exchange of letters took place:

June 19th, 1935

Dr. Loren C. Petry, Secretary
Botanical Society of America
Cornell University
Ithaca, New York

Dear Dr. Petry:

In 1913 the Botanical Society of America and the Brooklyn Botanic Garden entered into a cooperative agreement for the editing and publishing of a research journal, the *American Journal of Botany*.

I believe that this *Journal,* now in its 22nd volume, has the largest circulation of any journal devoted exclusively to botanical research, with the possible exception of governmental publications. As a result of this, the published research of members of the Botanical Society reaches a larger number of readers than would be the case with almost any other similar periodical. The mailing list includes the principal botanical institutions of research and higher education in 53 countries.

What the members of the Botanical Society think of the advantage of the *Journal* as a medium for the publication of research is reflected in the fact that the editor now has in hand accepted manuscripts sufficient to fill nearly two volumes of the present average size.

A comparative analysis of the cost of manufacturing seven American periodicals devoted to botanical research, made at the

request of the business management by our printers, has disclosed the fact that 1,000 words of research, with the illustrations, are published in *American Journal of Botany* at an average cost less than that for any other journal of equal quality of paper, press-work, and other details. I have given to the special Journal Committee of the Society the data on which this statement is based.

American Journal of Botany is sent to all paid-up members of the Botanical Society at one-half its regular subscription price of $7.00 a year, and at a rate lower than the subscription price of any other botanical journal of comparable size and quality. This has, in some years, been possible only by generous subsidies provided by the Brooklyn Botanic Garden from its own funds or obtained by the Garden from other sources. The cash contributions from the Garden have totaled $5,284.87 since the *Journal* was established; those from other sources have totaled $3,500.00.

Year by year the details of business management have become more numerous and complicated, until the *Journal* has become a major responsibility of the Brooklyn Botanic Garden and a major demand on the time and energy of the Business Manager.

Paragraph 3 (*d*) of the Agreement between the Society and the Garden provides that the Agreement "may be terminated by either party only after written notice to terminate shall have been given to the proper official, at least one year in advance." In view of the facts stated in the preceding paragraph of this letter, the Brooklyn Botanic Garden wishes to give notice hereby that it will be glad to terminate the present cooperation in the production of the *American Journal of Botany*, and to turn over to whomever the Society may officially designate such records, funds, and property of the *Journal* as it now has in its possession, including the back volumes and odd copies now on hand.

The Garden will be glad to have the cooperation terminated at the earliest convenience of the Society and not later than one year from January 1, 1936.

Yours sincerely,

(signed) C. Stuart Gager,
Director.

November 6, 1935

Director C. Stuart Gager
Brooklyn Botanic Garden
Brooklyn, N. Y.

Dear Dr. Gager:

With considerable reluctance the Council of the Botanical Society of America has voted to terminate the agreement between the Brooklyn Botanic Garden and the Society, as requested in your letter of June 19, 1935. Since it is mutually agreed to end the contract I am sure that it will be of benefit to both parties to do so at the earliest possible date, and I suggest January 1, 1936 as the date upon which the agreement shall be terminated.

Sincerely yours,

(signed) Loren C. Petry,
Secretary.

APPENDIX 10

AMERICAN JOURNAL OF BOTANY

REPORT OF THE BUSINESS MANAGER FOR THE PERIOD JANUARY 1, 1914 TO DECEMBER 31, 1935

The fiscal year of the *Journal* ends on November 30. Since this is the last annual report to be given by the present Business Manager, the financial statement for the entire period of thirteen months, ending December 31, 1935, will be filed with the Secretary of the Society as soon as possible after that date.

The following is presented as a brief summary of financial matters for the 22 year period of cooperation:

About 25 years ago the need for larger opportunities for publishing botanical research began to be felt, and the Botanical Society of America appointed a committee to consider the possibility of establishing an official journal.

The chief obstacle seemed to be the difficulty of securing the necessary financial support and responsibility. After the matter had been studied and reported on at the business meetings of the Society for some two or three years, the Brooklyn Botanic Garden

was asked if it would cooperate with the Society, take charge of the business management, and assume certain financial responsibility.

The Trustees of the Garden approved the recommendation of the Director that this proposal be accepted, and he was authorized to execute, on behalf of the Garden, the *Agreement* under which the Society and the Garden have cooperated in the production of the *Journal* since January, 1914.

It was the present Business Manager who christened the new publication, "AMERICAN JOURNAL OF BOTANY," and prepared the first dummy, establishing the physical characteristics of the *Journal*.

From a circulation of less than 400 and a budget of $1775 in 1914, the *Journal* grew to a circulation of 1,673 and a budget of $19,073.51, as of November 30, 1930, dropping to a circulation of 1,561 and a budget of $10,810.44 as of November 30, 1935. The largest circulation for the 22 year period was 1,704 in 1931.

By the terms of the *Agreement*, the Botanic Garden assumed financial responsibility for three years of not to exceed $1,000 a year for deficits. The Society made an initial contribution of $300, and agreed to contribute to the *Journal* each year the total interest income on its invested funds.

The initial subscription price to non-members was $4.00, and to members of the Society $3.00. The steady increase in the cost of labor and materials brought about by the World War made it necessary to advance the subscription price to $5.00 in 1917, to $6.00 in 1920, and to $7.00 in 1927. Notwithstanding these necessary increases, the number of non-member subscriptions increased about 800 per cent (from about 50 in 1916 to 473 in 1931, dropping to 440 in 1935). This was brought about, in large part, by extensive worldwide advertising.

The subscription price to members was advanced to $3.50 in 1918. The advance in the subscription price to non-members (as of 1935) was 75 per cent, but to members only 16⅔ per cent. While the Business Management supplied the *Journal* to members at a discount of 25 per cent on a $4.00 subscription for the first three years, the members' discount for the last nine years has been 50 per cent on a $7.00 subscription.

Although the subscription price to members has not increased since 1918, the number of pages of published research delivered to members increased from 555 (small format) in 1918, to 1,065 (large format) in 1930, dropping again to 950 in 1935. This increase was due, in small part, to the author-payment plan for prompt publication of papers.

Furthermore, members obtained for their published papers the advantage of a quadrupled circulation. The advantage to contributors of a large circulation is often lost sight of.

The total annual difference (for the entire membership) between the subscription price to non-members and to members has varied from $291 (291 members @ $1.00) in 1914 to a maximum of $3,689 (1,054 members @ $3.50) in 1930, with an average (1914–1935) of $2,205.

The total amount of the cash benefits received in this way by the Society through its individual members for the 22 years of the *Journal's* existence is $48,513. Against this, the Society has made annual contributions (of interest and other income) totaling $9,-468.29, leaving a net cash benefit derived by the members of the Society of $39,044.71 ($48,513—$9,468.29).

During 1935 the *Journal* has been sent gratis to 32 corresponding members of the Society.

Also, during 1935 the *Journal* has been sent to 97 exchanges. The *Agreement* provided that there should be exchanges. The journals received in exchange have been freely at the disposal of members of the Society, and they have been frequently loaned to the libraries of other institutions for the use and convenience of the members. The cost of printing the copies of *American Journal of Botany* sent in exchange is estimated at approximately $30 a year.

The cash value of the journals received in exchange would be laborious to calculate on account of the fact that their subscription prices are largely in terms of foreign currencies, and the rate of exchange constantly fluctuates. The subscription value of the exchanges received in 1935 has been estimated at approximately $300. For most years it has been considerably below that figure.

In no case has a subscription ever been converted into an exchange, and it is doubtful if any of the current exchanges could be converted into subscriptions.

Between 1914 and 1930 the number of persons entitled to the privilege of publishing in *American Journal of Botany*, through membership in the Society, increased nearly four times (from 291 to 1,054). During the same period papers accepted for publication began to accumulate faster than they could be published.

During the entire 22 year period the Business Management, without any cost to the *Journal*, has provided office equipment and overhead, telephone service (a considerable item), and innumerable miscellaneous items of office supplies.

Also, storage accommodation for back numbers which have now reached a total of 38,714 copies or, on the basis of 10 numbers to a volume, the equivalent of a library of 3,871 volumes.

Some part of the time of five persons, besides the Business Manager, has been given to *Journal* business for many years. The monetary value of the services of these five persons for 1935, calculated on the percentage of time given and the salary rates of each, amounts to a total of nearly $1,600. Against this, the *Journal* paid, in 1935, $900, leaving a net contribution by the Botanic Garden of nearly $700 worth of personal service.

During the past 22 years the *Journal* has paid a total of $7,630 for the personal service of the Business Management. Against this, the Botanic Garden has contributed a total of $5,284.87, leaving a difference of $2,345.13 paid from regular *Journal* income. Dividing this by 22, we find that the *Journal* has paid out of its regular income, exclusive of Botanic Garden contributions, an average of $106.56 a year, or $8.88 a month, for personal service, which has involved a portion of the time of six persons—Business Manager, Business Manager's secretary, stenographer, stock room clerk, accountant, and business office clerk. Only the two latter have ever received any compensation for their services. *American Journal of Botany* business has taken some part of the time of practically every business day for many years.

In addition to making cash contributions totaling $5,284, the Management has secured from the National Academy of Sciences "grants-in-aid" totaling $3,500. In securing these grants, the Management was handicapped by the discrepancy above noted between the amounts of members' and non-members' subscriptions. Thus, in transmitting one of its contributions, the Secretary of the Academy wrote to the Business Manager as follows:

"In selling this journal to the members of the Botanical Society of America at its present low price, the Management is continuing an economically unjustifiable practice, and a practice which is out of line with that of every other research journal in the United States which has presented a case to the National Academy with a request for aid."

This statement was passed on by the Business Manager to the Treasurer of the Society, but the amount of members' subscriptions was never increased.

For the advantage of members of the Society, a *Professional Advancement Page* was carried in the *Journal* for several years. By a nominal payment of 25 cents to apply toward the cost of printing, members of the Society could insert notices of positions or change of positions wanted. The correspondence involved by this service on the part of the Business Manager was very considerable, but it resulted in securing positions or better positions for numerous members of the Society.

By the *Agreement* of 1914, the back numbers and volumes of the *Journal,* although housed and administered by the Botanic Garden, remain the exclusive property of the Society. At the earliest convenience of the Society, the Botanic Garden will turn over to it approximately 38,714 back numbers.

There are 36 complete sets of 22 volumes each having an advertised sales value, at $178 a set, of $6,408.

In addition, there are 30,794 back numbers, in incomplete sets, having an advertised sales value of $1.00 each—a total of $30,794.

Since the *Journal* was approaching the fiscal year ended November 29, 1930, with an unencumbered balance of $4,578.88, it was thought wise to invest $2,000 as the nucleus of a permanent fund for the *Journal,* leaving an unencumbered balance of $2,578.88 as of November 29, 1930.

Thus the Botanic Garden, at the termination of the partnership, will turn over to the Botanical Society of America bonds having a face value of $2,000 and property having a total sales value of $37,202, or total assets of $39,202.

Respectfully submitted,

(*Signed*) C. STUART GAGER,
Business Manager.

December 31, 1935.

APPENDIX 11[1]

The Brooklyn Institute of Arts and Sciences

BROOKLYN BOTANIC GARDEN

Exercises in Commemoration

of the

TWENTY-FIFTH ANNIVERSARY

of the

BROOKLYN BOTANIC GARDEN

(1910–1935)

MONDAY, TUESDAY, WEDNESDAY, AND THURSDAY

MAY 13–16, 1935

[1] The program is printed here precisely as it was distributed during anniversary week.

COMMEMORATION PROGRAM

MONDAY EVENING, MAY 13
The Auditorium: Laboratory Building
1000 Washington Avenue

8:30 P.M.

Formal exercises for Officials, Garden Members and Invited Guests

MR. EDWARD C. BLUM
President of the Board of Trustees
Presiding

Introductory Remarks
MISS HILDA LOINES
Chairman of the Botanic Garden Governing Committee

Announcements
DR. C. STUART GAGER
Director, Brooklyn Botanic Garden

GREETINGS
For the City of New York
HONORABLE RAYMOND V. INGERSOLL
President of the Borough of Brooklyn

For the Department of Parks
HONORABLE ROBERT MOSES
Commissioner of Parks, New York City
President of the Long Island State Park Commission

For the Educational Institutions
HONORABLE GEORGE J. RYAN
President of the Board of Education

Address
BOTANY AND HUMAN AFFAIRS
ALBERT F. WOODS, Agr. D., LL.D., Hon. Sc.D.
Director, Graduate School, U. S. Department of Agriculture
Principal Pathologist, Bureau of Plant Industry, Washington, D. C.
President, Maryland State College of Agriculture (1917–20),
and of University of Maryland (1920–26)
Member, National Research Council since 1917
President, First Inter-American Scientific
Conference on Agriculture, Forestry, etc., Washington, 1930

RECEPTION

By the Trustees and the Woman's Auxiliary
Inspection of Exhibits on the Main Floor following the Program

TUESDAY, MAY 14

TWENTY-FIRST ANNUAL SPRING INSPECTION

FOR OFFICIALS, MEMBERS, AND INVITED GUESTS

His Honor, FIORELLO H. LAGUARDIA
Mayor of the City of New York
Guests of Honor

PROGRAM

The tour of Inspection will start from the Laboratory Building promptly at 3:30 o'clock.

Guests, accompanied by members of the Garden personnel as guides, will be conducted in groups of convenient size.

ITINERARY

1. The Japanese Garden.
2. Cherry Walk and the flowering trees adjacent.
3. The Overlook from which a view may be had of
4. The Horticultural Section, recently graded and partially planted this spring.
5. The Local Flora Section, containing only plants that grow wild within 100 miles of Brooklyn.
6. Return past the Rose Garden and Lilies-of-the-Valley to the Laboratory Building.

EXHIBITS AND TEA

Tea will be served in the Laboratory Building by the Woman's Auxiliary, following the Tour of the Grounds.

During the serving of tea there will be on view exhibits showing the progress of development of the Botanic Garden from 1910 to 1935, the resources of its Library and Herbarium, and the Scientific and Educational work now in progress.

WEDNESDAY MORNING

9:00 — 10:30 O'clock
REGISTRATION
INSPECTION OF EXHIBITS IN LABORATORY BUILDING
AND CONSERVATORIES

10:30 — 12:30 P.M.
SCIENTIFIC PROGRAM

Presiding: PROF. R. A. HARPER,
Emeritus Professor of Botany, Columbia University.
Member, National Academy of Sciences.
President, Botanical Society of America, 1916.
Chairman, Division of Biology and Agriculture, National Research Council, 1923–1924.

1. *Virus Diseases of Plants: Twenty-five Years of Progress,* 1910–1935.
DR. L. O. KUNKEL,
Head of the Department of Plant Pathology, Rockefeller Institute for Medical Research, Princeton, N. J.

2. *Twenty-five Years of Cytology,* 1910–1935.
PROF. CHARLES E. ALLEN,
Professor of Botany, University of Wisconsin.
Member, National Academy of Sciences.
President, Botanical Society of America, 1921.
Chairman, Division of Biology and Agriculture, National Research Council, 1929–1930.
Vice-president, Section of Cytology, 6th International Botanical Congress, Amsterdam, 1935.

3. *Twenty-five Years of Genetics,* 1910–1935.
DR. ALBERT F. BLAKESLEE,
Acting Director, Station for Experimental Evolution, Carnegie Institution of Washington.
Member, National Academy of Sciences.
Member, Division of Biology and Agriculture, National Research Council, 1931–1932.
President, Section of Genetics, 6th International Botanical Congress, Amsterdam, 1935.

WEDNESDAY AFTERNOON

12:30 — 1:30 P.M.
INVITATION BUFFET LUNCHEON, LABORATORY BUILDING

1:30 — 2:30 P.M.
INSPECTION OF EXHIBITS AND PLANTATIONS

2:45 — 5:00 O'clock
SCIENTIFIC PROGRAM

Presiding: PROF. EDMUND W. SINNOTT,
Professor of Botany, Barnard College, Columbia University.
Editor-in-Chief, American Journal of Botany, 1926–1932.
President, Torrey Botanical Club, 1930–1932.

1. *Twenty-five Years of Plant Physiology,* 1910–1935.
DR. RODNEY H. TRUE,
Professor of Botany and Director of the Botanic Garden, University of Pennsylvania.
Director of the Morris Arboretum.
Physiologist, in charge of Physiological Investigations, U. S. Department of Agriculture, 1902–1920.
Vice-president and Chairman of Section G (Botany), American Association for the Advancement of Science, 1920.

2. *Light on Vegetation,* 1910–1935.
DR. JOHN M. ARTHUR,
Boyce Thompson Institute for Plant Research.

3. *Twenty-five Years of Ecology,* 1910–1933.
DR. H. A. GLEASON,
Head Curator, New York Botanical Garden.
Director, Botanical Garden and Arboretum, University of Michigan, 1915–1919.
Editor, The Botanical Review.

4. *Twenty-five Years of Forestry,* 1910–1935.
PROF. SAMUEL N. SPRING,
Dean, New York State College of Forestry, Syracuse University.
Professor of Forestry, University of Maine, 1903–1905.
State Forester, Connecticut, 1909–1912.
Professor of Silviculture, Cornell University, 1912–1932.

WEDNESDAY EVENING

At 8:15 O'clock

SCIENTIFIC PROGRAM

Presiding: DR. WILLIAM CROCKER,
Director, Boyce Thompson Institute for Plant Research.
Chairman, Division of Biology and Agriculture, National Research Council, 1927–1928.
Vice-president and Chairman of Section G (Botany), American Association for the Advancement of Science, 1925.

1. *Twenty-five Years of Plant Pathology*, 1910–1935.
PROF. L. R. JONES,
Professor of Plant Pathology, University of Wisconsin.
Vice-chairman, Division of Biology and Agriculture, National Research Council, 1921–1922.
President, Botanical Society of America, 1913.
President, Section of Mycology and Plant Pathology, 5th International Botanical Congress, Cambridge, 1930.
2. *Twenty-five Years of Systematic Botany*, 1910–1935.
DR. ELMER D. MERRILL,
Director, New York Botanical Garden.
President, Section of Systematic Botany, 6th International Botanical Congress, Amsterdam, 1935.
Member, National Academy of Sciences.

3. *Twenty-five Years of Paleobotany*, 1910–1935.
DR. G. R. WIELAND,
Associate Carnegie Institution of Washington.
Associate Professor of Paleobotany, Yale University.
Archduke Rainer (Vienna) Gold Medalist, 1914.
Vice-president, Section of Paleobotany, 5th International Botanical Congress, Cambridge, 1930.

4. *Motion Picture* (*Silent*). The Life Cycle of a Fern. 2 Reels, 35 mm. Harvard Film. *Premier Showing.*

THURSDAY MORNING

9:00 — 10:30 O'clock
REGISTRATION
INSPECTION OF EXHIBITS IN LABORATORY BUILDING AND CONSERVATORIES

10:30 — 1:00 O'clock
HORTICULTURAL PROGRAM

Presiding: MR. JOHN C. WISTER,
Director, Arthur Hoyt Scott Horticultural Foundation, Swarthmore College, Swarthmore, Pa.
Secretary, The Pennsylvania Horticultural Society.
Vice-president, John Bartram Association.
Secretary, American Rose Society, 1921–1923.
President, The American Iris Society, 1920–1934.

1. *Twenty-five Years of Horticultural Progress, with Special Reference to Foreign Plant Introduction*, 1910–1935.
DR. W. E. WHITEHOUSE,
Senior Horticulturist, U. S. Department of Agriculture.
Explorer, Bureau of Plant Industry, U. S. D. A. 1929–1930.
Westover-Whitehouse Expedition, U. S. Dept. Agr., to France, Germany, Russia, and Persia, 1929.

2. *Opportunities for Women in Horticulture*, 1910–1935.
DR. KATE BARRATT,
Principal, The Swanley (England) Horticultural College.
Lecturer in Botany, Imperial College of Science and Technology, London, 1913–1932.

3. *Growing Plants in Sand with the Aid of Nutrient Solutions: With Special Reference to Practical Applications.*
PROF. C. H. CONNORS,
Head of the Department of Floriculture and Ornamental Horticulture, New Jersey Agricultural Experiment Station.
Professor of Ornamental Horticulture, Rutgers University.

4. *Modern Methods of Plant Propagation.*
DR. P. W. ZIMMERMAN,
Plant Physiologist, Boyce Thompson Institute for Plant Research.

5. *Plant Patents.*
COL. ROBERT STARR ALLYN,
Author of *The First Plant Patents* (New York, 1934).
Deputy Commissioner of Sanitation, New York City.

6. *Motion Picture.* Naturalized Plant Immigrants.
U. S. Department of Agriculture, Bureau of Plant Industry. 2 Reels.

THURSDAY AFTERNOON

1:00 — 2:00 O'clock

INVITATION BUFFET LUNCHEON, LABORATORY BUILDING

2:00 — 3:00 O'clock

INSPECTION OF EXHIBITS AND PLANTATIONS

Model Classes of Children in Session

Instructional Greenhouse and Children's Garden

3:00 — 3:45 O'clock

TEA

Hostess, The Junior League of Brooklyn

Main Floor Rotunda

4:00 O'clock

EDUCATIONAL PROGRAM

Presiding: DR. JOHN S. ROBERTS,
Associate Superintendent of Schools, New York City.

1. *Botanical Education for Young People.*
   DR. D. W. O'BRIEN,
   Assistant Director, Department of Manual Arts, The School Committee of the City of Boston.

2. *Twenty-five Years of Botanical Education,* 1910–1935.
   PROF. OTIS W. CALDWELL,
   Professor of Education, Teachers College, Columbia University.
   Director, Institute of School Experimentation, Columbia.
   Chairman, Committee on the Place of the Sciences in Education, American Association for the Advancement of Science.

3. *Motion Picture.* How Seeds Germinate.
   U. S. Department of Agriculture, Bureau of Plant Industry. 1 Reel.

THURSDAY EVENING

8:15 O'clock
EDUCATIONAL PROGRAM

ADULT EDUCATION

NEW TECHNIQUES IN EDUCATION

Presiding: MR. JULIUS M. JOHNSON,
President, The New York Association of Biology Teachers.
Head, Department of Biology, Haaren High School, Manhattan, New York City.

1. *Adult Education in Botany.*
DR. LOREN C. PETRY,
Professor of Botany, Cornell University.
Secretary, Botanical Society of America.

2. *Radio in Botanical Education.*
MR. MORSE SALISBURY,
Chief of Radio Service, United States Department of Agriculture.

3. *Motion Pictures: Their Part in American Education.*
DR. CLARENCE E. PARTCH,
Dean, School of Education, and Director of the Summer Session, Rutgers University.

4. *Demonstration of Silent "Movies" and "Talkies."*
a. Time-Lapse Studies in Plant Growth. 1 Reel.
U. S. Department of Agriculture Film.
b. Plant Life (A Sound Film). 1 Reel.
Harvard Film Service.

INFORMAL RECEPTION

Hostess, The Garden Teachers' Association of the Botanic Garden

INSPECTION OF EXHIBITS ON THE MAIN FLOOR

SPONSORING COMMITTEE

FOR THE TWENTY-FIFTH ANNIVERSARY

MR. WILLIAM T. HUNTER, *Chairman*

Dr. Frank L. Babbott, Jr.
Mrs. Frank L. Babbott, Jr.
Mrs. Robert Bacon
Mr. George A. Barnewell
Mr. Leonard Barron
Hon. William R. Bayes
Rt. Rev. John L. Belford
Mr. Henry H. Benedict
Mr. Philip A. Benson
Mr. Edward C. Blum
Mrs. Edward C. Blum
Mrs. George E. Brower
Mr. Roscoe C. E. Brown
Mrs. Samuel A. Brown
Mrs. Jonathan Bulkley
Mrs. Glentworth R. Butler
Miss Mary Butterick
Rev. S. Parkes Cadman
Mr. Frederick L. Cadman
Mrs. William H. Cary
Mrs. William H. Childs
Major Gilmore D. Clarke
Mr. Frederick L. Cranford
Mrs. Frederick L. Cranford
Mr. Walter V. Cranford
Mrs. Walter V. Cranford
Mr. William G. Creamer
Mr. W. H. Crittenden
Judge James C. Cropsy
Mr. Russell V. Cruikshank
Mr. Henry J. Davenport
Mrs. Henry J. Davenport
Mrs. John R. Delafield
Dr. John H. Denbigh
Miss Mary Dillon
Mrs. H. Edward Dreier
Mrs. T. Coleman du Pont
Mrs. William P. Earle, Jr.
Mrs. William F. Eastman
Mr. Walter Ebinger
Mr. Frank D. Fackenthal
Mr. Gates D. Fahnestock
Mr. James A. Farrell
Mr. George W. Felter
Mr. Sumner Ford
Mrs. Sumner Ford
Mr. De Witt A. Forward
Mr. Lewis W. Francis
Mrs. Lewis W. Francis
Mr. Kenneth Frazier
Dr. C. Stuart Gager
Mrs. C. Stuart Gager
Mrs. William H. Good
Mr. M. Preston Goodfellow
Mr. Clarence L. Hay
Mrs. A. Augustus Healy
Mrs. James M. Hills
Mrs. Ralph P. Hinchman
Mr. William T. Hunter
Mrs. Clarence R. Hyde
Hon. Raymond V. Ingersoll
Mrs. Raymond V. Ingersoll
Mr. Edward A. Ingraham
Mr. Ralph Jonas
Mrs. William Kennedy, Jr.
Mr. Almet R. Latson, Jr.

Judge Edward Lazansky
Mrs. Maxwell Lester
Mr. Clarence M. Lewis
Mr. Luke V. Lockwood
Mrs. William A. Lockwood
Miss Hilda Loines
Rev. Alexander Lyons
Mr. Edwin P. Maynard
Mrs. Edwin P. Maynard
Hon. George V. McLaughlin
Mrs. Edward W. McMahon
Mrs. Whitney Merrill
Miss Alice Morse
Hon. Robert Moses
Mr. Alfred E. Mudge
Mrs. Alfred E. Mudge
Mr. Thomas E. Murray, Jr.
Major Benjamin Namm
Mr. Dean C. Osborne
Mrs. Dean C. Osborne
Mr. Clifford E. Paige
Mr. Carleton H. Palmer
Mr. John C. Parker
Mr. Fremont C. Peck
Mrs. Charles E. Perkins
Mrs. William S. Peters
Mr. James H. Post
Miss Jessie W. Post
Hon Lewis H. Pounds
Mr. Charles Pratt
Mr. Frederic B. Pratt
Mrs. Frederic B. Pratt
Mrs. Harold I. Pratt
Mrs. Richardson Pratt
Mr. William A. Putnam
Mrs. William A. Putnam
Mr. Frederick W. Rowe
Mrs. Samuel Seabury
Mr. John T. Scheepers
Mr. Max Schling
Miss Ellen Eddy Shaw
Mr. Robert A. Shaw
Mrs. Frank E. Simmons
Mrs. Henry Spelman
Mr. J. E. Spingarn
Mrs. Theron G. Strong
Mrs. Herman Stutzer
Mr. Edwin H. Thatcher
Mrs. Edwin H. Thatcher
Mrs. John Van Buren Thayer
Mr. Charles H. Totty
Mrs. Winthrop M. Tuttle
Mr. John T. Underwood
Mrs. John T. Underwood
Mr. Adrian Van Sinderen
Mrs. Adrian Van Sinderen
Dr. Edwin G. Warner
Mr. William J. Wason, Jr.
Mr. Alain White
Mrs. Alexander M. White
Miss Harriet H. White
Mr. Louis C. Wills
Judge George A. Wingate
Miss Mary B. Woodward
Mr. Richardson Wright
Hon. Richard Young

APPENDIX 12

ANNOUNCEMENTS *

By C. Stuart Gager, *Director*

During the brief five minutes allotted to each of our preliminary speakers, I would like to make a few announcements that are not confined to the events of our anniversary week. I would like to announce my personal indebtedness to various organizations and individuals without whose cooperation and support literally nothing could have been accomplished in establishing and developing the Brooklyn Botanic Garden to its present transitional stage. I speak of it as a transitional stage, for a botanic garden is not like a statue or a building; it never becomes a completed work. It is an organic thing, beginning as a germ and continuing for all time toward a standard of perfection which will never be fully realized.

The Botanic Garden, like the museums and other semi-public institutions of this city, articulates with the City through the Department of Parks. This has always been a most happy and helpful relationship. There have been six Park Commissioners since the Garden was established. With the approval and support of Commissioner Kennedy, in 1910, the plans for the initial development of our buildings and grounds were approved and the appropriations secured.

The second Commissioner was in office during the Borough Presidency of my good friend, Mr. Lewis H. Pounds, and is honoring us with his presence here this evening as our present Borough President. It was Mr. Raymond V. Ingersoll who secured the planting of the trees on the west side of Washington Avenue opposite our conservatories—a much needed improvement. During his commissionership, also, the "South Addition" was incorporated in the area of the Garden, and we are indebted for his cooperation in this. The very helpful and pleasant relationship established at that time has been continued since Mr. Ingersoll, to our great satisfaction, became the President of the Borough of Brooklyn.

*Address delivered at the Twenty-fifth Anniversary exercises of the Brooklyn Botanic Garden, May 13, 1935.

During the administration of Commissioners O'Loughlin, Harmon, and Browne, this spirit of helpful cooperation was continued, and to our gratification occasions began to multiply for the Botanic Garden to reciprocate some of the courtesies of the Department of Parks.

In 1934, the office of Commissioner of Parks of the Borough of Brooklyn was discontinued, but under Mr. Moses, the first Commissioner of Parks of Greater New York, a ready and understanding cooperation is being continued in full measure.

There was, at first, a feeling of mild apprehension when the Borough Commissionership was abolished. There is a river between the Borough of Manhattan and the Borough of Brooklyn. Unlike most rivers its width varies according to the direction in which one travels across the bridges; it is *so* much wider in going from Manhattan to Brooklyn than when going from Brooklyn to Manhattan.

But, unlike his Biblical namesake, the present Commissioner has never been content merely to view the land of promise, which is Brooklyn, from a high place in Manhattan. He has insisted in crossing the river in spirit as well as in fact, and in considering Brooklyn as an integral part of Greater New York.

The Brooklyn Botanic Garden is already indebted to Commissioner Moses and his staff for numerous courtesies.

I wish also to announce our obligation to the PWAP (Public Works of Art Project) through which the busts of six botanists were modelled in plaster and now adorn our main floor rotunda. Also to the CWA (Civil Works Administration) and its successor the TERA (Temporary Emergency Relief Administration) to whom we are indebted for the foundational work in the development of the three acres of our North Addition, which now constitute our Horticultural Section.

In particular, I am happy to announce our gratitude to Colonel William J. Wilgus, until last week the efficient head of the Works Division of the Emergency Relief Administration. We are partly indebted to him for the improved acoustics of this auditorium and for efficient cooperation in other ways.

I must not fail to announce the obligation of the director and staff to our Boys and Girls Club of several hundred members.

They are rendering valuable assistance throughout the exercises of this week, as they do on all occasions when called upon.

Also to the Garden Teachers Association of the Botanic Garden, generous contributors of service and money and moral support for the furtherance of our work.

The English language is said to be more deficient than other languages in synonyms for adjectives, and especially for superlatives. I never realize this so much as when I endeavor to express my appreciation for all that our Woman's Auxiliary has meant and is meaning to the Brooklyn Botanic Garden. The Oxford Dictionary defines "auxiliary" as "a quantity introduced for the purpose of facilitating some operation." With our Woman's Auxiliary in mind I wish to supplement that definition by adding that, in my experience, our auxiliary is an organization of public spirited, civically minded, sympathetically and enthusiastically interested women, identified with a botanic garden as an integral and indispensable part of it, for the purpose of enabling it to do what it needs to do but could by no possibility accomplish without such an organization.

The greatest need of such an institution as this is people who are *enthusiastic* about it. I can assure you that nothing can put such spirit and energy and courage into a director and staff as the realization that others are not merely interested but are *enthusiastic*. Archimedes said, "Give me a place to stand and I can move the world." Give a botanic garden supporters who believe in it sufficiently to be enthusiastic about it, and it can even make progress in a period of world-wide economic depression.

For the planting of the Plaza in front of this building, for the planting of our Horticultural Section, for the materials used in improving the interior of this auditorium, for many new members and friends of this Garden, for moral, as well as financial support, for keeping us strong where we would otherwise have been weak, our Trustees and the Director and Staff are under a lasting debt of gratitude to the members of our Woman's Auxiliary.

Perhaps no form of public service is more thoroughly altruistic than that of being a trustee. Trustees are so often taken for granted. Credit for substantial accomplishment so often is given to salaried executives when it should go to trustees, or at least be

shared by them. I am happy to make it one of my "announcements" that one of the most solid satisfactions of my twenty-five years as director has been my close association with the men and women of our Board of Trustees, and especially the Botanic Garden Governing Committee of the Board. There is neither time nor necessity to mention them all by name, but this occasion should not pass without mentioning Mr. A. Augustus Healy, President of the Board for the first eleven years of the Garden's history; Colonel Robert B. Woodward, vice-president of the Board; Mr. Herman Stutzer, Secretary, Mr. Babbott and Mr. Blum, subsequent presidents; the members of the original Governing Committee who are still on the Committee—Mr. Gates D. Fahnestock, Mr. Walter H. Crittenden, and Mr. William A. Putnam; the present chairman, Miss Hilda Loines—and the more recent members.

On the floor above is an exhibit to illustrate the various activities of this Garden. It was installed by the Curators and other members of the Garden personnel; it is a record of *their* work. If the Garden has, to any gratifying degree, measured up to the ideals of the founders and their successors, the credit is due in most generous measure to the ability and loyalty of the Garden personnel. This, of course, is the universal result of good teamwork. I am gratified to have an opportunity to give this public expression of appreciation.

And now, just a brief announcement of our indebtedness to a few individuals.

After an existence of twenty-five years, the Brooklyn Botanic Garden has a gate at only one entrance. This is the Richard Young Gate at the south Flatbush Avenue entrance. This gate was made possible in 1930 by Mr. Young's most generous gift of $17,000. How sorely the other three gates are needed! How discouraging that, after twenty-five years of public service, we still do not have them! What an admirable opportunity they offer for private philanthropy! What splendid Public Works Projects they would make!

It was under the administration of Mr. Young as Commissioner of Parks of Brooklyn and Queens that the main portion of the grounds of this Garden was preserved from being built upon and

was reserved as an open space, thus making possible the very site of the Garden.

Our President, Mr. Blum, has already paid tribute to Professor Franklin W. Hooper, who was the first to suggest the idea of a botanic garden on this site. His service to Brooklyn in building up the Brooklyn Institute of Arts and Sciences, of which the Garden is a Department, can never be overestimated.

In the Boys and Girls Clubroom, where I hope you can all go before leaving this evening, is a portrait of one who was called in his lifetime Brooklyn's most useful citizen. Underneath this portrait we have placed the following quotation as epitomizing his ideals and his accomplishments: "To build the city is the great accomplishment, not to possess it." What a wonderful city this would be—what a wonderful world this would be—if this were the ideal of every citizen! When we speak in this way of a former Brooklynite, it is never necessary to state that the man was Alfred T. White. He has been justly called "the father of the Brooklyn Botanic Garden." He not only laid the cornerstone of this building, but himself became the cornerstone of the institution whose work has centered here during the past twenty-five years.

To those, however, who know and understand, it is not possible to think or speak of what Mr. White meant to this institution without thinking and speaking of two others, near and dear to him, anonymous by their own wish, who, together with him and through him, not only made possible the establishment of this Botanic Garden in 1910 but, more than any other one factor, have made possible the accomplishment of the Garden's services to this city and its world-wide services to science and education. This, for all time, will be the outstanding fact in the history of this Botanic Garden, just as John Harvard and Eli Yale are the outstanding facts in the history of the universities that bear their names.

Last week the British Empire celebrated the twenty-fifth anniversary of the reign of King George V. In his address to the King last Thursday noon, the Lord Chancellor emphasized the fact that the British Empire is rooted in tradition and long history. The very Hall of Westminster, he recalled, epitomized British history, with its beams of mediaeval oak, and its six centuries of unbroken history.

This building we are in is not as old as the Botanic Garden, but the enterprise in which we are engaged here was old before the Angles and Saxons conquered what is now Britain. We may truly regard the exercises of this evening as marking, for the moment, the apex of a course of events that began when Aristotle studied the plants of classic Greece, wrote several books on botany, and, at his death, endowed the "botanic garden" of Athens, of which his pupil, Theophrastus, was the first "director."

Of course, the study of plants is older than that, for it was the botanist and pomologist, Adam, who gave to the plants of his garden their names, and he did this at Divine command. Next September there will be held in Holland an International Botanical Congress which will have, for one of its important and difficult tasks, the continuation of the work begun by Adam, namely, determination, if possible, of what the names of plants really are or should be. We are, at this instant, the end term of a great and glorious tradition, but tomorrow we shall be only a link in a chain that reaches out to the far distant future as well as backward to the past.

Our slogan is "For the advancement of botany and the service of the city." We are, all of us, dependent every day of our lives on plant life for our food and our shelter, our heat and our light, our rubber-tired automobiles, and for much of the beauty of nature, without which life would not be worth living.

A botanic garden is not only an asset to a city, it presents a wonderful and appealing opportunity for civic service and for helping to advance our knowledge, our culture, and our civilization.

OFFICERS OF THE BOARD OF TRUSTEES

PRESIDENT
EDWARD C. BLUM

FIRST VICE-PRESIDENT
WALTER H. CRITTENDEN

SECOND VICE-PRESIDENT
ADRIAN VAN SINDEREN

THIRD VICE-PRESIDENT
SUMNER FORD

TREASURER
EDWIN P. MAYNARD

SECRETARY
JOHN H. DENBIGH

BOTANIC GARDEN GOVERNING COMMITTEE
MISS HILDA LOINES, CHAIRMAN

PHILIP A. BENSON
EDWARD C. BLUM, *Ex officio*
MRS. WILLIAM H. CARY
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
MRS. LEWIS W. FRANCIS
[1]JOHN W. FROTHINGHAM
WILLIAM T. HUNTER
EDWIN P. MAYNARD
ALFRED E. MUDGE
[2]WILLIAM A. PUTNAM

EX OFFICIO MEMBERS OF THE BOARD

THE FOLLOWING OFFICIALS OF THE CITY OF NEW YORK
THE MAYOR
THE COMPTROLLER
THE COMMISSIONER OF PARKS

MEMBERS OF THE BOARD

(Trustees are Elected from the Life Membership of the Brooklyn Institute of Arts and Sciences)

Bayes, Hon. William R.
Beers, E. LeGrand
*Benedict, Henry Harper
Benson, Philip A.
Blum, Edward C.
Cadman, Rev. S. Parkes, D.D.
Cary, Mrs. William H.
Crittenden, Walter H.
Curtin, John J.
Denbigh, Dr. John H.
Draper, Mrs. Mary Childs
Fahnestock, Gates D.
Farrell, James A.
Ford, Sumner
Francis, Mrs. Lewis W.
Frazier, Kenneth
*Frothingham, John W.
Good, Mrs. William H.
Healy, Mrs. A. Augustus
Hunter, William T.
Jonas, Ralph
Lewisohn, Sam A.
Lockwood, Luke Vincent
Loines, Miss Hilda
Maynard, Edwin P.
McLaughlin, Hon. George V.
Morgan, John Hill
Mudge, Alfred E.
Murray, Thomas E., Jr.
Osborne, Mrs. Dean C.
Parker, John C.
Post, James H.
Pratt, Charles
Pratt, Mrs. Frederic B.
*Putnam, William A.
Shaw, Robert Alfred
Underwood, John T.
Van Sinderen, Adrian
*Warner, Dr. Edwin G.
York, Rt. Rev. Mgr. John C.

[1] Deceased, November 20, 1935. [2] Deceased, February 29, 1936.
* Deceased.

WOMAN'S AUXILIARY

MRS. GLENTWORTH R. BUTLER, Honorary Chairman
MRS. IRVING L. CABOT, Chairman
Mrs. Charles E. Potts, Vice-Chairman
Mrs. George E. Brower, Secretary-Treasurer
Mrs. Henry J. Davenport, Chairman, Membership Committee
Mrs. Edwin H. Thatcher, Chairman, Social Committee

Babbott, Mrs. Frank L.
Betts, Miss Dorothy L.
Blum, Mrs. Edward Charles
Boardman, Mrs. George M.
Braman, Miss Emily L.
Braman, Miss Irene M.
Brewster, Mrs. Walter Shaw
Brinsmade, Miss Alice
Brower, Mrs. George E.
Brown, Mrs. G. Stewart
Brown, Mrs. Samuel A.
Butler, Mrs. Glentworth R.
Butterick, Miss Mary E.
Cabot, Mrs. Irving L.
Carroll, Mrs. Otis Swan
Carter, Mrs. Oliver Goldsmith
Cary, Mrs. William H.
Childs, Mrs. William H.
Coutts, Miss Frances H.
Cranford, Mrs. Frederick L.
Cranford, Mrs. Walter V.
Cruikshank, Mrs. Russell V.
Davenport, Mrs. Henry J.
Delafield, Mrs. John R.
Diller, Mrs. Frank J. W.
Draper, Mrs. Mary Childs
Dreier, Mrs. H. Edward
Duncan, Mrs. Cameron
Earle, Mrs. William P., Jr.
Eidlitz, Mrs. Ernest Frederick
Fiske, Mrs. E. Rodney
*Folger, Mrs. Henry C. J.
Ford, Mrs. Sumner
Francis, Mrs. Lewis W.
Frank, Mrs. George S.
Frothingham, Mrs. Theodore L.
Gager, Mrs. C. Stuart
Garvin, Mrs. Edwin L.
Goetze, Mrs. Otto
Good, Mrs. William H.
Greenman, Mrs. William B.
Gunnison, Mrs. Herbert F.
Hammitt, Mrs. Walter
Harrisson, Mrs. Stephen M.
Healy, Mrs. A. Augustus
Hill, Mrs. Robert C.
Hills, Mrs. James M.
Hume, Mrs. Russell S.
Hyde, Mrs. Clarence R.
Ingersoll, Mrs. Raymond V.
Ingraham, Mrs. Henry A.
James, Mrs. Darwin R., Jr.
Jameson, Mrs. P. Chalmers
Jameson, Miss Jeanetta C.
Jennings, Mrs. John E.
Jonas, Mrs. Ralph
Kennedy, Mrs. William, Jr.
Knox, Miss Maria
Lathrop, Mrs. John H.
Leech, Mrs. John E.
Lester, Mrs. Maxwell
Lincoln, Mrs. Roy M.
Lockwood, Mrs. William A.
Loines, Miss Hilda
Lyman, Mrs. Frank
MacKay, Mrs. Frederick D.
Mark, Mrs. Henry A.
Marshall, Mrs. William W.
Maynard, Mrs. Edwin P.
Maynard, Mrs. Edwin P., Jr.
McLanahan, Mrs. Scott
McMahon, Mrs. Edward W.
Merrill, Mrs. Whitney
Mudge, Mrs. Alfred E.
Noble, Mrs. Francis L.
O'Donohue, Mrs. Charles A.

Osborne, Mrs. Dean C.
Otis, Mrs. Charles H.
Paffard, Mrs. Frederic C.
Palmer, Mrs. Carleton H.
Parsons, Mrs. Frank H.
Peck, Mrs. Bayard L.
Perkins, Mrs. Charles E.
Perry, Mrs. John M.
Peters, Mrs. Wm. Sterling
Pierrepont, Miss Julia J.
Post, Miss Jessie W.
Potts, Mrs. Charles E.
Pratt, Mrs. Frederic B.
Pratt, Mrs. Richardson
Prince, Mrs. Benjamin
Putnam, Mrs. William A.
Rice, Mrs. Winthrop Merton
Righter, Miss Jessie H.
Roberts, Mrs. John S.
Rowe, Mrs. Frederick W.
Seabury, Mrs. Samuel
Shaw, Mrs. Awbrey N.
Shaw, Miss Ellen Eddy
Sherman, Mrs. Arnold W.
Simmons, Mrs. Frank E.
Smith, Mrs. B. Herbert
Southard, Miss Edith Brett
Spence, Mrs. John L., Jr.
Stewart, Mrs. Seth Thayer
Stutzer, Miss Elise W.
Stutzer, Mrs. Herman
Thatcher, Mrs. Edwin H.
Thayer, Mrs. Gordon C.
Truslow, Mrs. Walter
Tuttle, Mrs. Winthrop M.
Underwood, Mrs. John T.
Van Brunt, Mrs. Jeremiah R.
Van Sinderen, Mrs. Adrian
Warbasse, Mrs. James P.
Warren, Mrs. Luther F.
White, Mrs. Alexander M.
White, Miss Harriet H.
Wilcox, Mrs. T. Ferdinand
Wilson, Mrs. Francis A.
Woodward, Miss Mary Blackburne

LIST OF MEMBERS

(Revised to April 3, 1936)

For information concerning the various classes of membership consult the pages preceding this Report

Benefactors

By contribution of $100,000 or more, or by gifts of equivalent value

*Samuel P. Avery
*Carl H. De Silver
*Augustus Graham
*A. Augustus Healy
*Alfred T. White
*Robert B. Woodward

Patrons

By contribution of $25,000 or more, or by gifts of equivalent value

*Frank L. Babbott
*Miss Mary Benson
*Edwin Gould
*Edward L. Graef
*Mrs. John Hills
*Alfred W. Jenkins
*Frank S. Jones
*Alfred Duane Pell
*Mrs. Caroline H. Polhemus
*William A. Putnam
*Charles A. Schieren
John T. Underwood
Miss Frances E. White
Miss Harriet H. White

Donors

By contribution of $10,000 or more, or by gifts of equivalent value

*Abraham Abraham
Dr. Frank L. Babbott
*Henry Batterman
*James A. H. Bell
*Mrs. Eugene G. Blackford
*William Calverly
*William H. Cary
Mrs. William H. Childs
*Walter V. Cranford
Walter H. Crittenden
Mrs. Ella J. Filson
*George A. Hearn
*Joseph C. Hoagland
*Samuel N. Hoyt
Mrs. Mary Babbott Ladd
Mrs. Joseph H. Lester
*Frederick Loeser
Mrs. Ian MacDonald
*Henry P. Martin
*Miss Matilda McLean
*Joseph T. Perkins
*George D. Pratt
*Henry K. Sheldon
Mrs. Lydia Babbott Stokes
*Herman Stutzer
*Hon. Richard Young

Permanent Members

By contribution of $2,500 or more, or by gifts of equivalent value

Abraham, Mrs. Abraham
Barclay, Mrs. Reginald
Barnes, Mrs. Richard S.
Beers, E. LeGrand
Beers, Miss M. Elizabeth
*Beers, Mrs. Mary L.
Beers, Dr. Nathan T.
*Benedict, Henry Harper
Blackford, Eugene G.
Blum, Edward C.
Boocock, Murray
*Boody, Hon. David A.
*Brackett, Miss Mary A.
Brown, Mrs. Lilla
Campbell, Miss Mary
Carroll, Mrs. Otis Swan
*Coffin, Mrs. Sturgis
*Cook, Henry F.
Day, Mrs. Emily L.
English, Mrs. J. Radford
*Evans, Miss Mabel Louise
Fahys, George E.
*Fahys, Joseph
First Unitarian Church Society
Freifeld, Mrs. George
Godfrey, Mrs. Edwin D.
Good, Mrs. John, Sr.
*Gottsberger, Francis
*Healy, Frank
*Hearn, Mrs. George A.
*Hentz, Henry
*Herriman, Miss Helen
Higgins, Tracy
*Hoagland, Mrs. Joseph C.
*Hoagland, Raymond
Hoagland, Miss S. W.
Hodenpyl, Eugene, Jr.
How, Miss Josephine W.
Hoyt, Mrs. Mark
*James, John S.
*Jones, Mrs. Mary L.
*Jones, Townsend
Joost, Mrs. Martin
Kelso, William G., Jr.
*Lawrence, Henry C.
*Lawrence, Lysander W.
Lawrence, Richard H.
Lindgrove, Mrs. Marjorie S.
*Lord, Mrs. John Bradley
Low, A. Augustus
Maxwell, J. Rogers, Jr.
McMahon, Jos. T.

*Morse, Horace J.
Oakley, Mrs. Theodora L.
*Olcott, George M.
*Palmer, Lowell M.
Peabody, George Foster
Pell, Mrs. Cornelia L.
Post, James H.
Powell, Mrs. Robert E.
Sanger, William
*Sanger, William Cary
Self, Mrs. Edgar A.
*Sheldon, Mrs. Henry K.
Simonds, Mrs. William R.
Smith, Mrs. Annie Morrill
Smith, Howard C.
Vander Weyde, Mrs. N. J.
Walsh, Mrs. Anna F.
Webster, Miss Aileen
*White, Alexander M.
*Woodward, Mrs. John B.

Life Members

By contribution of $500 or more, or by gifts of equivalent value

Through the Botanic Garden

Bailey, Frank
Bobbink, Lambertus C.
Butler, Mrs. Glentworth R. (In memory of Dr. Glentworth R. Butler.)
Cary, Mrs. William H.
Childs, Eversley
Engelhardt, George P.
*Folger, Mrs. Henry C. J.
Frothingham, Miss Elisabeth W.
*Frothingham, John W.
Hicks, Henry
Hunter, William T.
Jonas, Ralph
Loines, Miss Hilda
Mudge, Alfred E.
Osman, Fred D.
Potts, Maj. Charles E.
*Pratt, Charles M.
Smith, Mrs. Annie Morrill
Southwick, Dr. E. B.
Thatcher, Edwin H.
*Young, Hon. Richard

Through other Departments of the Institute

Abraham, Lawrence E.
Ager, John Winifred
Albertson, Rev. Charles Carroll
Allan, Mrs. Evelyn W.
Allen, Miss Mary W.
*Anderson, Mrs. John
Babbott, Dr. Frank L.
Banbury, James J.
Bannister, Miss Eleanor C.
Batterman, Charles H.
Batterman, Henry L.
Batterman, Miss Minnie P.
Baxter, F. W.
Bayes, Hon. William R.
Baylis, A. B.
Baylis, Wm., Jr.
Benson, Philip A.
Bigelow, Edward F.
Blumenthal, Maurice
Blydenburgh, Frank J.
Bolwell, Mrs. Sarah A.
Boody, Alvin
Brasher, Philip
Brasher, Reginald I.
Brockway, Miss Emma A.
Brown, Miss A. W.
Brown, John W.
Buek, Mrs. Cecilia
Burnham, Dr. Clark
Cadman, Rev. S. Parkes

Campbell, Mrs. Wm. Mitchell
*Casey, Hon. Thomas F.
Chauncey, Rev. E. F.
Chittenden, Miss Alice H.
Claflin, John
Clarke, Rev. L. Mason
Corlies, Howard
Cram, Mrs. Howard W.
Crane, Judge Frederick E.
Crittenden, Walter H.
Cunningham, Mrs. F. W.
Curtin, John J.
Curtis, Henry S.
Dalby, Archibald B.
Davis, William T.
Denbigh, Dr. John H.
Dixon, Theodore P.
Dougherty, Andrew, Jr.
Doyle, Mrs. Allan M.
Draper, Ernest G.
Draper, Mrs. Mary Childs
Dreier, Theodore
Dykeman, Conrad V.
Eastman, Mrs. William F.
Elmhirst, Mrs. Dorothy P. Whitney
English, George L.
Evans, Mrs. Gertrude C.
Fahnestock, Gates D.
Fara Forni, Mme. A. F.
Farmer, Walter B.
Farrell, James A.
Farrier, Albert Moses
Farrier, Frederick B.
Ferrier, Miss Elizabeth A.
Field, Miss E. Elizabeth
Fish, Mrs. Ivy Chapel
Flagg, Mrs. T. Benson
Flinsch, Rudolph E. F.
Foote, Alfred Sherman
Ford, Sumner
Francis, Mrs. Lewis W.
Francken-Sierstorpff, Countess von
Frank, Mrs. George S.
Frazier, Kenneth
Frothingham, Miss Elisabeth W.
Frothingham, Miss Helen H.
*Frothingham, John W.
Gardener, William
Gibb, William T.
Gifford, Ira L.
Gilbert, Miss A. Louise M.
Gilbert, William T.
Good, Mrs. John, Jr.
Good, Mrs. William H.
Goodnow, David F.
Goodnow, Prof. Frank J.
Goodnow, Weston W.
Grace Church (Brooklyn)
Hall, Charles H.
Halsey, William B.
Healy, Mrs. A. Augustus
Heckscher, August
Hester, Mrs. Ada Gibb
Hill, William B.
Hollenback, Miss Amelia B.
Hooker, D.
Hooper, Mrs. Franklin W.
Hornaday, Dr. William T.
Huber, Joseph
Hulbert, Mrs. Henry C.
Husson, Miss Julie
Hyde, Henry St. John
Hyde, James H.
Ingraham, Miss Frances
Ingraham, George S.
Jeffrey, Dr. Stewart L.
Johnson, Alvin R.
Jones, Miss Emily W.
Joost, Mrs. Martin
Kahn, Mrs. Otto
Kelekian, Dikran G.
Kellogg, Dwight H.
Kennedy, Mrs. Mary A.
Kenyon, Mrs. Irene S.
Kenyon, Whitman W.
Ladd, Mrs. Mary Babbott
Lang, Mrs. Robert
Latimer, Miss Julia W.
*Lewis, Mrs. August
Lewisohn, Adolph
Lewisohn, Sam A.
Lincoln, Mrs. Dorothy Chapel

Litchfield, E. Hubert
Lockwood, Luke Vincent
Love, Mrs. Henry D.
Low, Ethelbert Ide
Low, Josiah O.
Ludlum, Clinton W.
Lyman, Frank
Lynde, Mrs. Martha R.
Macbeth, Robert W.
MacDonald, Rev. Robert
Mason, William P.
Mathews, Mrs. Albert H.
Maxwell, Henry L.
May, Joseph M.
Maynard, Edwin P.
McAneny, Hon. George
McConnell, Rev. S. D.
McKay, Mrs. John S.
McLaughlin, Hon. George V.
Melish, Rev. John H.
Metcalf, Jesse
Moffat, David
Moffat, William L.
Moore, Mrs. W. H.
Morgan, John Hill
Morse, Miss Alice L.
Morse, Charles L.
Mundhenk, Herman
Murray, Thomas E., Jr.
O'Connor, Mrs. W. B.
Ogilvie, Donald Manson
*Orr, Miss Mary Moore
Osborne, Mrs. Dean C.
Packard, Miss Mary S.
Paige, Clifford E.
Palmer, Henry L.
Parker, Asa W., Jr.
Parker, Gordon
Parker, John C.
Peet, Mrs. Louis Harman
Pierrepont, John J.
Pierrepont, Seth Low
Polhemus, Miss R. A.
Potts, Maj. Charles E.
Pratt, Charles
Pratt, Frederic B.
Pratt, Mrs. Frederic B.
Pratt, Harold I.
Prentiss, Russell E.
Prosser, Thomas Harold
Prosser, Walter R.
Putnam, Harrington
Putnam, Mrs. William A.
Ramsdell, Mrs. F. Van N.
Robinson, George C.
Robinson, Dr. Nathaniel
Ruger, Mrs. Adolph
Ruscoe, Miss Rose
Russell, James T., Jr.
Russell, Mrs. Talcott H.
*Sackett, Charles A.
Sanbern, Mrs. Frank H.
Schenck, Miss Eunice M.
Schieren, Harrie Victor
Shaw, Robert Alfred
Sheldon, Mrs. Anna B.
Sheldon, Henry
Smith, G. Foster
Snow, Helmer
Squier, Frank
Stevens, Mrs. Roy G.
Stevens, Shepherd
Stewart, Douglas MacC.
Stokes, Mrs. S. Emlen
Stutzer, Miss Elise W.
Sullivan, Andrew T.
Taylor, Miss Bessie
Taylor, Mrs. Helen S.
Taylor, William H.
Thayer, Mrs. Anna K.
Thursby, Miss Ina
Tucker, Mrs. George S., Jr.
Turner, Mrs. Bertha C.
Tuthill, Miss Isabel H.
Valentine, P. A.
Van Anden, Miss Susan M.
Van Sinderen, Adrian
Van Sinderen, Mrs. Adrian
Wagner, Miss Marie
Walbridge, Robert R.
Warbasse, Mrs. James P.
Ward, Miss Helen

Warner, Dr. Edwin G.
Weber, Mrs. Herman C.
Webster, Mrs. Edward H.
White, Harold T.
White, S. V.
Whitney, Sumner B.
Wisner, Mrs. Horatio S.
Woodward, Miss Mary Blackburne
York, Rt. Rev. Mgr. John C.

Sustaining Members [1]

By payment of $25 annually

Adams, Charles S. (M)
Anderson, John (G)
Babbott, Dr. Frank L. (M)
Boetticher, Miss E. C. (G)
Bryant, Miss Helen W. (G)
Campbell, Miss Mary (M)
Davenport, Mrs. Henry J. (G)
Doolittle, Mrs. R. Edson (E)
Doscher, Mrs. A. B. (M)
Edwards, Mrs. Wm. Seymour (M)
Faber, Lothar W. (M)
Felter, Mrs. Mary Bentley (E)
Fernstrom, Miss Flora M. (E)
Field, Mrs. W. D. C. (M)
Froeb, Charles (M)
*Frothingham, John W. (M)
Good, Mrs. William H. (M)
Hart, Miss Adelaide (M)
Hart, Miss Lauribel (E)
Havemeyer, T. A. (G)
Hyatt, Miss Annie (E)
Ingraham, Edward A. (G)
Ingraham, Mrs. Henry C. M. (G)
Jenkins, Mrs. John Sloane (M)
Kirkman, Mrs. A. S. (M)
Lambert, Frank (M)
Lamphear, Mrs. Amos S. (G)
Langdon, Mrs. Palmer H. (G)
*Langdon, Palmer H. (G)
Latimer, Miss Mary (G)
Leech, Mrs. John E. (G)
Logan, Miss Anna A. (E)
Loomis, Guy (M)
Lorence, Louis (E)
Morton, Dr. L. J. (M)
Pasternack, Mrs. Richard (M)
Perkins, Mrs. Charles E. (E)
Pierrepont, Miss Julia J. (M)
Price, Mrs. William H. (M)
Reimer, Miss Margareth B. (M)
Righter, Miss Jessie H. (M)
Rossin, Alfred S. (M)
*Rothschild, Simon F. (G)
Sartori, Joseph J. (G)
See, Alonzo B. (M and G)
Simmons, Mrs. Frank E. (G)
Sklar, Mrs. Max (E)
Uhrbrock, Mrs. E. F. (G)
Underwood, Mrs. John T. (M)
Van Vleck, Miss Jane (M)
Weber, F. C. (E)
White, Mrs. Grace (E)
Wood, Miss Emily S. (E)
Zoebisch, Mrs. C. T. (M)

[1] (G), Through the Botanic Garden; (M), Museum; (E), Educational Department.

Brooklyn Botanic Garden Annual Members

By payment of $10 annually

Abramson, Sidney
Adams, Henry S.
Affeld, F. O.
Allen, Miss Gertrude Harcourt
Altschuler, Mrs. Gussie
*Anderson, Mrs. John
Andrews, Miss Grace
Arnold, Mrs. William H.
Babbott, Mrs. Frank L.
Bacon, Mrs. Robert
Bampton, Miss Joan Walters
Banker, John F.
Barbanell, Miss Charlotte
Bay Ridge Garden Club
Beck, Mrs. Anna W.
Becker, Frederick W.
Becker, Miss Johanna L.
Beckerman, Bernard
Begowsky, Miss Lillian
Behr, Edward A.
Behr, Miss Maria O.
Benedict, Mrs. Albert R.
Benson, Mrs. Philip A.
Berg, Mrs. J. Frederic
Berkenfeld, Israel
Berman, Harold
Bernstein, Abraham
Betts, Miss Dorothy L.
Beverly Garden Club
Bildersee, Miss Adele
Bittner, Mrs. L.
Blackman, Dr. William W.
*Blankley, Miss Jessie W.
Batchford, Miss Edna Léonie
Blatchford, Miss Stella
Bleimeyer, Miss Rose
Blum, Mrs. Edward Charles
Boardman, Mrs. George M.
Boehrer, Charles A.
Bornmann, Dr. Alfred
Bossert, John
Bossert, Mrs. L.
Boys' High School, Brooklyn
Bradley, Miss Florence
Braman, Miss Irene M.
Branagan, Miss Elizabeth A.
Brandt, Mrs. Laura L.
Brewster, Mrs. Walter Shaw
Brinsmade, Miss Alice
Brockaway, Mrs. Otilia A.
Brooklyn Plant, Flower and Fruit Guild
Brossard, Miss Theodora
Brower, Frank Daniel
Brower, Mrs. George E.
Brown, Mrs. G. Stewart
Brown, Miss May A.
Brown, Roscoe C. E.
Brown, Mrs. Samuel A.
Brown, Mrs. Samuel T.
Brown, Mrs. Theodore Burgess
Browning, Dr. William
Brukenfeld, Morris
Buckley, Miss Jane T.
Burgess, Mrs. Julian H.
*Butler, Edward M.
Butterick, Miss Mary E.
Cabot, Dr. Irving L.
Cadman, Mrs. Frederick L.
Caldwell, Mrs. B. Palmer
Camp, Miss Caroline D.
Campbell, Miss Mary
Canis, Prof. Otto P. M.
Carter, Mrs. Oliver Goldsmith
Cary, Mrs. William H.
Cedarhurst Garden Study Group
City Gardens Club
Clark, Miss Agnes B.
Clark, Dr. Raymond
Cleveland, Miss Eleanor Naomie
Coffin, Mrs. I. Sherwood
Collins, Mrs. H. S.
Conover, Mrs. Henry S.
Contemporary Club, The
Corcoran, Mrs. James J.
Cornman, Mrs. Tessie

Costantino, Mrs. R.
Cotz, Victor
Coutts, Miss Frances H.
Coykendall, Mrs. W. E.
Crane, Mrs. Claude G.
Cranford, Frederick L.
Cranford, Miss Margaret
Cranford, Mrs. Walter V.
Creamer, William
Crosby, Mrs. Milward
Cruikshank, Russell V.
Cruikshank, Mrs. Russell V.
Currie, Mrs. James N.
Cuthrell, Mrs. Faith B.
Daly, Miss Anne
Dana, Mrs. Arnold Guyot
Dana, Mrs. Arthur D.
Dann, James E.
Darrow, Mrs. Wirt E.
Dauernheim, A. M.
Davidson, Mrs. John A.
Decker, Mrs. Charles A.
deComps, Miss Pauline L.
de Kay, Mrs. Sidney Gilder
Delafield, Mrs. John R.
Denbigh, Miss Helen D.
De Silver, Mrs. Albert
De Voe, Franklin M.
deWaal, Mrs. Christian
Dickey, Miss Annie Louise
Dietz, Nicholas
Dillon, Miss Mary E.
Dinsmore, Mrs. Laird C.
Ditmas, Miss Caroline
Doane, Albert C.
Dodge, Mrs. Francis D.
Doherty, Mrs. Philip A.
Doman, Mrs. Samuel H.
Donovan, Miss Loretto V.
D'Orsi, Miss Theresa
Dreher, Miss Hertha M.
Dreier, Mrs. H. Edward
Duhme, Mrs. H. F.
Duncan, Mrs. Cameron
Dunn, Mrs. W. Edwin
du Pont, Mrs. T. Coleman
DuVal, Guy
DuVal, Mrs. Guy
Earle, Mrs. Wm. P., Jr.
Eckardt, Mrs. Remick C.
Eckstein, Harry
Edinburg, Mrs. William G.
Eidlitz, Mrs. Ernest Frederick
Eilers, Miss Emma
Eisenberg, Miss Esther
Elbert, Mrs. William
*Eldert, Mrs. Cornelius
Eldredge, Mrs. O. Stanley
Elmer, Mrs. Charles W.
Emerson, Mrs. William
Emmer, Mrs. Sophia G.
Epstein, Herbert
Ericsson, Miss H. Wilhelmina
Ernstorff, Joseph W.
Espenschied, Mrs. Thyra
Etzel, Mrs. Mary M.
Everit, Mrs. Edward A.
Fairbanks, Miss Maria B.
Fairchild, B. T.
Fairchild, Mrs. F. K.
Far Rockaway Women's Club: Garden Group
Fardelman, Mrs. A. Von Prief
Fawcett, Judge Lewis L.
Feld, Miss Estelle
Feldman, Herman
Ferris, Mrs. Joseph W.
Field, Frederick
Fisher, Miss Edna M.
Fisher, Mrs. S. L.
Fiske, Mrs. E. Rodney
Fitzhugh, Mrs. William W., Jr.
Fitz Patrick, Mrs. M. J.
Flacks, David
Flushing Garden Club, Inc.
Foote, Mrs. Merrill N.
Ford, Mrs. Sumner
Fortnightly Library Club
Foster, Miss A. M.
Fox, Mrs. Mortimer J.
Frauson, Mrs. George E.
Free, Mrs. Montague

Freiman, Miss Bess G.
Freistater, Mrs. Rose
Fricke, Miss Helen M.
Frohne, Mrs. Theodore
Fuchs, Samuel J.
Fulda, Mrs. H. C.
Fultz, Mrs. Marjorie
Gaillard, Mrs. William Dawson
*Gale, Mrs. Alexander B.
Gallagher, Miss Augusta
Gallup, Miss Anna B.
Garden Club of Laurence
Gardiner, Mrs. A. S.
Gerwin, Mrs. Sarah
Geschelin, Sam
Gibson, Miss Gertrude L.
Gillingham, Mrs. Catherine R.
Gillingham, James L.
Girls Commercial H. S., Brooklyn
Girls' High School, Brooklyn
Gladding, Walter M.
Gluckson, Mrs. Isadore
Goddard, Mrs. Eleanor S.
Goetze, Miss Emily H.
Goetze, Mrs. Otto
Gonnoud, A. J.
Goodfellow, Mrs. M. P.
Goodman, Joseph
Gordon, Dr. Onslow A., Jr.
Grasty, Mrs. Mabel R.
Great Neck Garden Club
Great Neck Woman's Club: Garden Committee
Green, Dr. Wyman R.
*Griffin, Frank E.
Gross, Martin
Gunnison, Mrs. Herbert F.
Gustafson, Miss Anna M.
Haas, Miss Edith
Haff, Mrs. Alvah C.
Haggerty, Mrs. John J.
Hagstrom, Mrs. Henry Theodore
Hale, Miss Alfaretta May
Halstead, Miss A. E.
Halstead, Mrs. J. Morton
Halstead, Mrs. Kenneth B.
Halsted, Mrs. Henry M.
Hamburger, Mrs. Jerome W.
Hamilton, Mrs. George S.
Hanks, Miss Lenda T.
Hargitt, Dr. Chas. A.
Harris, Mrs. Augustus
Harrisson, Mrs. Stephen M.
Hatheway, Mrs. Philip M.
Hawes, Dr. Edward S.
Haynes, Mrs. Edward
Haynes, Miss Mabel
Healy, D. J.
Hearns, Mrs. Frank T.
Hecht, Miss Sadie
Hegeman, Mrs. D. V. B.
Heissenbuttel, Mrs. Henry C.
Heissenbuttel, Mrs. Wm. F.
Heller, Dr. Jacob
Helm, Mrs. Gustave A.
Henning, Mrs. George
Herlehy, Mrs. Frances E.
Herschler, Mrs. Freda
Hershcovitz, Eli
Hester, Mrs. W. V., Jr.
Hevle, Miss Frances M.
Higgins, Dr. Alice K.
Hilborn, Mrs. L. T.
Hill, Mrs. Robert C.
Hills, Mrs. James M.
Hinchman, Mrs. Ralph P.
Hirschberg, Mrs. Benjamin
Hoag, Mrs. J. Edward
Hoffmann, Mrs. George J.
Holcombe, Mrs. Walter P.
Hollenback, Miss Amelia B.
Hollwegs, Miss Anna
Hollwegs, Miss Katherine
Howard, Miss Laurette
Hoyt, Miss Anne S.
Hoyt, Miss Mary F.
Hume, Mrs. Henry M.
Hume, Mrs. Russell S.
Humpstone, Mrs. O. Paul
Hunter, Mrs. William T.
Hutton, Miss Sarah E.
Iffla, Miss Florence E.

Ingersoll, Mrs. Raymond V.
Ingraham, Miss Grace
Ingraham, Henry A.
Ingraham, Dr. Ruth
Irish, William S.
*Jackson, Edward
Jackson, Mrs. Edward
Jackson, Mrs. Samuel, Sr.
Jadwin, Mrs. Palmer H.
Jadwin, Mrs. Stanley P.
James, Mrs. Darwin R., Jr.
James, Mrs. Warner
James, William L.
James Madison High School, Biology Dept.
Jameson, Mrs. A. Stedman
Jameson, Dr. P. Chalmers
Jameson, Mrs. P. Chalmers
Jansen, Miss Dora
Jennings, Miss Annie B.
Jewell, John V.
Johanns, Mrs. Frederick L.
Johnson, Mrs. David C.
Johnston, Mrs. F. Cliffe
Johnston, Miss Florence
Jones, Mrs. Jane Bates
Jones, Mrs. Wallace T., Jr.
Jones, Mrs. Wallace Thaxter
Jourdan, James H.
Judd, Mrs. Orrin R.
Kaplan, Miss Esther Beatrice
Kaufman, I. C.
Kay, Miss Lillian S.
Keating, Miss Margaret R.
Kennedy, Mrs. James
Kennedy, Mrs. William, Jr.
Ketcham, Miss Clara L.
Kindergarten Mother's Club, P. S. 241
King, Mrs. Warner
Kirk's School, Miss
Klempner, Mrs. Ida
Knox, Miss Maria
*Kolb, William D. A.
Korey, Miss Ruth A.
Koss, Miss Elenore
Kunz, Mrs. M. R.
Lafrentz, Miss Olga L.
Lancaster, Miss Bertha
Lane, Miss Ella M.
Lane, Mrs. LeRoy C.
Lantry, Mrs. Joseph P.
Lathrop, Mrs. John H.
Laura S. Stewart Garden Club
Lawrence, Mrs. Herbert
Lawrence School, The
Lea, Mrs. Robert B.
Lee, Miss Catherine
Leininger, Mrs. Ralph
Lester, Mrs. Maxwell
Levin, Miss Anna C.
Levine, Miss Cecelia
Levingson, Isaac
Lewis, Miss Anna
Lewis, Clarence McK.
Lincoln, Mrs. Roy M.
Litchfield, Miss Cornelia
Lockwood, Mrs. William A.
Lohman, Mrs. W. H.
Loines, Miss Elma
Loines, Mrs. Stephen
Long, Mrs. Walter Pratt
Lott, Mrs. Henry DeWitt
Love, John H.
Lublin, Hyman
Lucia, Dr. William A.
Lynbrook Garden Group
Lyons, Edward
MacCauley, Miss Minnie
MacKay, Mrs. M. S.
Mackey, Mrs. J. T.
Mackey, Miss Mary R.
Manville, Mrs. H. Edward
Marcus, Benjamin
Marine Park Garden Club
Marks, Mrs. Alexander D.
Marrow, Miss Lucille
Marshall, Mrs. William W.
Matheson, Mrs. C.
Maynard, Mrs. Edwin P.
Maynard, Mrs. Edwin P., Jr.
McCammon, Miss Althea

McCarthy, Edward Joseph
McCarthy, Miss Mildred H.
McCormick, Mrs. E.
McDermott, Mrs. Arthur V.
McDonald, Dr. Milo F.
McGill, Mrs. Margaret
McHugh, Mrs. Mary F.
McKelway, Mrs. St. Clair
McLaren, James R.
McLean, Mrs. F. B.
McNeill, Malcolm, Sr.
McTiernan, Miss Mary
Mead, D. Irving
Meeker, Samuel M.
Mehl, Joseph
Meissner, Mrs. William C.
Mellen, Mrs. Graham K.
Meltzer, Mrs. Joseph
Melucci, Angelo
Merrill, Mrs. Whitney
Merritt, Miss Lilla H.
Merz, Dr. Frank G.
Meyenborg, Miss Evelyn A.
Michelsen, Mrs. Letitia M.
Miraglia, Miss Elvia
Montgomery, Mrs. C. H.
Moore, Miss Jane L.
Morgan, Miss Charlotte E.
Morse, Miss Alice L.
Mudge, Mrs. Alfred E.
Müller, Adolf
Mullikin, Mrs. Richard
Munson, Miss Katherine F.
Murray, Mrs. Joseph Bradley
Myerson, Mrs. M. C.
Natelson, Mrs. L. F.
Needham, Henry C.
Nellis, Dr. Frank G.
Nesmith, Miss Charlotte
Newman, Miss Louise M.
Newton, Mrs. Charles E., Jr.
North, Mrs. John H.
Novack, Miss Bessie
*Noyes, Mrs. Charles F.
Oak, Miss Dorothy
O'Brien, Mrs. A. J.
O'Donohue, Mrs. Charles A.
Ohly, Dr. John H.
O'Neill, Charles E.
Ormsbee, Mrs. Malcolm H.
Osborne, Mrs. Dean C.
Otis, Mrs. Charles H.
Paffard, Mrs. Frederic C.
Palmer, Miss Emma J.
Parent Teachers' Association, P. S. 241
Parker, Mrs. Elizabeth B.
Parshelsky, Moses L.
Parsons, Frank H.
Pashley, Mrs. Charles L.
Pass, Miss Rosalind
Paumanacke Garden Club
Peck, Mrs. Bayard L.
Peck, Fremont C.
Peckham, Mrs. Wheeler H.
Peloubet, Mrs. S. W.
Pa. School of Horticulture for Women
Penzer, Abraham
Perkins, Mrs. Charles E.
Perry, Mrs. John M.
Peters, Mrs. Wm. Sterling
Petrocelli, Mrs. J.
Pfeiffer, Miss C. A.
Phenix, Mrs. Spencer
Pierrepont, Miss Anna J.
Pierrepont, Miss Julia J.
Pilsbury, Mrs. E. H.
Pinkerton, Mrs. Robert A.
Platt, Mrs. Augustine R.
Platt, Miss E. L.
Platt, Rutherford
Plumb, Mrs. E. T.
Plump, Miss Julia H.
Pomeranz, Miss Caroline
Pond, Miss Pearl F.
Pond, William H.
Popper, Mrs. William C.
Porter, Mrs. E. Pender
Post, Mrs. James H.
Post, Miss Jessie W.
Potter, Mrs. R. Burnside

Powers, Miss Z. A.
Pratt, Abram J.
Pratt, Frederic B.
Pratt, Mrs. Frederic B.
Pratt, Harold I.
Pratt, Mrs. Katherine Sloan
Pratt, Miss Mary
Pratt, Mrs. Richardson
Price, Frank J.
Prince, Mrs. Benjamin
Provost, Miss Eva M.
Public School 155, Brooklyn
Public School 197, Brooklyn
Public School 241, Brooklyn
Purdie, Miss Bertha S.
Purdy, Miss Maud H.
Putnam, Mrs. Henry St. Clair
Queens Village Garden Club
Queensboro Garden Club
Raiman, Mrs. Robert I.
Raskin, Abraham
Rathbun, Mrs. Nathaniel P.
Redstone, Jacob Leonard
Reed, Mrs. George M.
Reimer, Mrs. Otto E.
Reinhardt, Mrs. Charles
Rice, Mrs. Winthrop Merton
Richardson, William C.
Roberts, Mrs. John S.
Roberts, Miss Willa
Roe, Mrs. Clinton T.
Rogers, Mrs. Charles E., Jr.
Rooney, Mrs. Mary T.
Rosati, Dr. Vincent F.
Rowe, Mrs. Frederick W.
Ruckgaber, Mrs. Louis A.
Rushmore, Dr. Jacques C.
Sanders, Edward I.
Satterlee, Mrs. Herbert L.
Scheepers, John T.
Schepmoes, Mrs. F. R.
Schiller, Miss Frances
Schnur, Miss Mildred
Schoonhoven, John J.
Schrader, Miss M. H.
Schwartz, George I.
Scoville, Mrs. Herbert
Seibert, Mrs. Albert E.
Sellew, Mrs. Waldo W.
Sellinger, Mrs. Jean D.
Sessler, David
Shanahan, Mrs. Thomas E. J.
Shaw, Miss Agnes M.
Shaw, Mrs. Awbrey N.
Shepard, Charles S.
Sherman, Mrs. Arnold W.
Shoreham Garden Club
Siebert, Mrs. William
Simpson, Miss Etta
Simpson, Mrs. T. A.
Sinclair, Mrs. Edith F.
Skovron, Morris J.
Smith, B. Herbert
Smith, Miss Bertha H.
Smith, George W.
Smith, Miss Leona A.
Smith, Mrs. Norman
Sobol, Miss Eva
Solensten, Mrs. R. T.
Solomon, Miss Eleanor
Southard, Miss Edith Brett
Spingarn, Mrs. Arthur B.
Spingarn, J. E.
Spingarn, Mrs. J. E.
Sprackling, Mrs. Nelson
Spring, Miss M. Louise
Staber, Miss Maud J.
Starkweather, Mrs. A. K.
Stedman, Mrs. J. W.
Steele, Mrs. Frederic T.
Steele, Roswell H.
Stein, Mrs. Ilma B.
Steinecke, Miss Jeannette A.
Stellwagen, Fred L.
Sternberg, Martin N.
Stevenson, Mrs. Charles G.
Stewart, Miss E. Grace
Stewart, Mrs. Seth Thayer
Stewart Manor Garden Club
Stobaugh, Miss Frances
Stout, Mrs. Charles H.
Straus, Hugh Grant

Strecter, Mrs. Milford B.
Strong, Mrs. Theron G.
Stuart, Lyall L.
Stutzer, Mrs. Herman
Sullivan, Miss Bessie
Sweedler, Nathan
Sygoda, David F.
Taber, Mrs. D. Shearman
Thacher, Mrs. A. B.
Thatcher, Mrs. Edwin H.
Thatcher, Mrs. John H.
Thayer, Mrs. Gordon C.
Thiemer, Mrs. E. J. H.
Thirkield, Mrs. Gilbert H.
Thorndike, Miss Elsie
Three Village Garden Club
Tiernan, Mrs. Bartholomew T.
Tille, Samuel
Tilley, Dr. R. McFarlane
Tompkins, Miss Elizabeth M.
Tousey, Miss Elizabeth
Towl, Mrs. F. M.
Traendly, Mrs. Frank H.
Trull, Mrs. Frank T.
Turner, Mrs. Henry C.
Tusch, Mrs. Walter
Tuttle, Mrs. Winthrop M.
Tyler, Mrs. Walter L.
Vail, Harry C.
Valentine, Stephen
Van Brunt, Jeremiah R.
Van Sinderen, Adrian
Van Sinderen, Mrs. Adrian
Van Sinderen, Henry B.
Von Lehn, Mrs. Richard
Walcott, Mrs. Arthur S.
Waldes, Mrs. Ica
Wallfield, Mrs. V.
Walmsley, Mrs. Clara E.
Walton, Mrs. Henry A.
Ward, Mrs. Charles L.
Wark, Charles F.
Warren, Mrs. Luther F.
Warren, William H.
Wason, Wm. J., Jr.
Watton, Mrs. W. F.
Wayman, Robert
Weber, Henry
Weber, Louis
Weeth, Dr. Charles R.
Weinberg, Harry
Weiss, Martin
Weithas, Mrs. R. C.
Wells, Mrs. Walter F.
Wenzel, Fred.
White, Alain
White, Mrs. Alexander M.
Wikander, Miss Elin
Wikle, Mrs. Herbert T.
Willard, George N.
Willetts, Mrs. W. P.
Williams, Mrs. John O.
Williams, Mrs. W. V.
Williamson, Miss Marguerite Molière
Wilson, Mrs. Christopher W.
Wilson, Mrs. Francis A.
Wing, Miss Beulah A.
Wood, Mrs. Guy C.
Wood, Mrs. Willis D.
Woodmere Garden Club
Woodward, Miss Mary Blackburne
Yale, Mrs. William T.
Young, J. Marshall
Zabriskie, Mrs. Elmer T.
Zadde, Mrs. Augusta
Zatz, Mrs. Gertrude
Zellner, Mrs. Carl P.
Zimmele, Charles F.

SUMMARY OF MEMBERSHIP

Benefactors		6
Patrons		14
Donors		26
Permanent Members		72
Life Members		
Through the Botanic Garden	21	
Through Other Departments	221	242
Sustaining Members		
Through the Botanic Garden	17	
Through Other Departments	37	54
Annual Members		617
Total, as of April 3, 1936		1,031

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President
EDWARD C. BLUM

First Vice-President
WALTER H. CRITTENDEN

Second Vice-President
ADRIAN VAN SINDEREN

Third Vice-President
SUMNER FORD

Treasurer
EDWIN P. MAYNARD

Secretary
JOHN H. DENBIGH

Botanic Garden Governing Committee

MISS HILDA LOINES, *Chairman*

PHILIP A. BENSON
EDWARD C. BLUM, *Ex officio*
MRS. WILLIAM H. CARY
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
MRS. LEWIS W. FRANCIS
WILLIAM T. HUNTER
EDWIN P. MAYNARD
ALFRED E. MUDGE
*WILLIAM A. PUTNAM

Ex Officio Members of the Board

The Following Officials of the City of New York
THE MAYOR
THE COMPTROLLER
THE COMMISSIONER OF PARKS

GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9–6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk: on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

* Deceased, February 29, 1936.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929-1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I. The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 69. Plants of the Astor Expedition, 1930 (Galapagos and Cocos Islands). 61 pages. 1935.

No. 70. Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag oats. 10 pages. 1935.

No. 71. Physiologic specialization of the parasitic fungi. 19 pages. 1935.

No. 73. Studies of the root nodule organisms of certain wild legumes. 19 pages. 1936.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

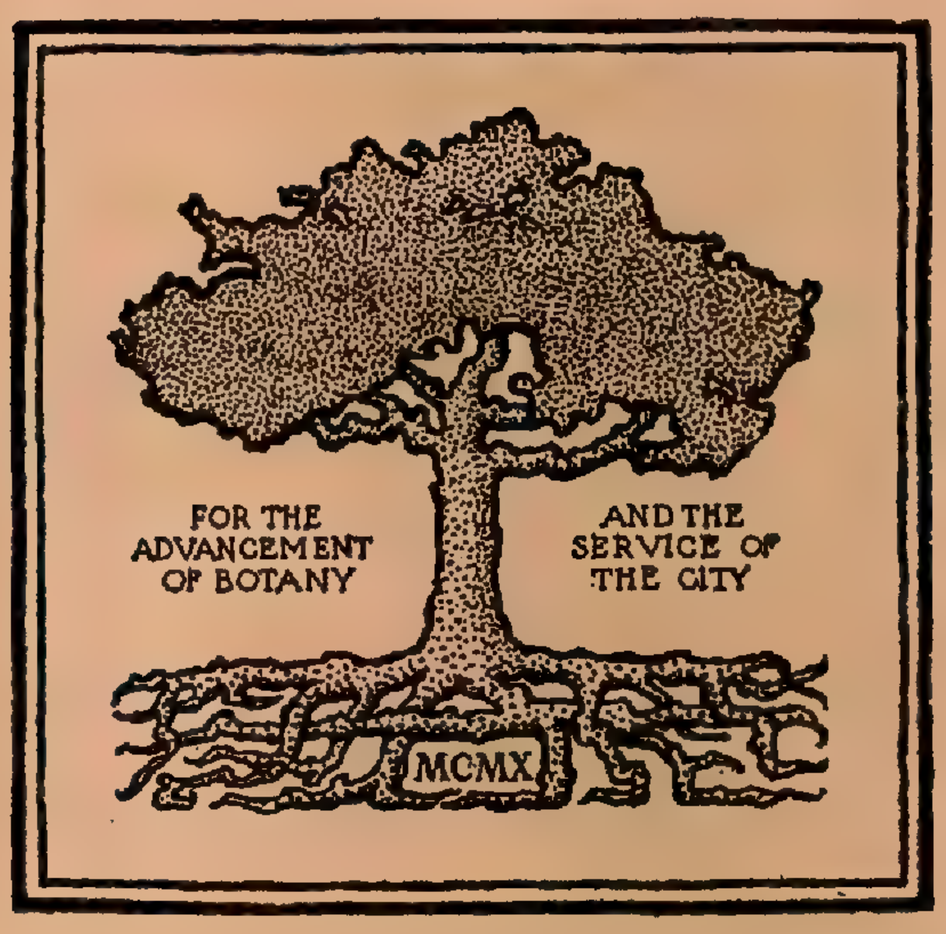
GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN

RECORD

VOL. XXV JULY, 1936 No. 3

EDITED BY
C. STUART GAGER



CONTENTS

PAGE

The Early Vegetation of Long Island. (A Long Island Tercentenary Publication) 207

PUBLISHED QUARTERLY
AT PRINCE AND LEMON STREETS, LANCASTER, PA.
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

Entered as second-class matter in the post-office at Lancaster, Pa., under act of August 24, 1912

BROOKLYN BOTANIC GARDEN

Scientific, Educational, and Administrative Officers

SCIENTIFIC AND EDUCATIONAL

The Staff

C. STUART GAGER, Ph.D., Sc.D., Pd.D., *Director*
MONTAGUE FREE, Certificate, Royal Botanic Gardens, Kew, *Horticulturist*
ARTHUR HARMOUNT GRAVES, Ph.D., *Curator of Public Instruction*
ALFRED GUNDERSEN, Docteur de l'Université (Paris), *Curator of Plants*
WILLIAM E. JORDAN, B.S., *Librarian*
GEORGE M. REED, Ph.D., *Curator of Plant Pathology*
ELLEN EDDY SHAW, B.S., *Curator of Elementary Instruction*
HENRY K. SVENSON, Ph.D., *Curator of the Herbarium*
[2] MARGARET M. DORWARD, A.B., *Assistant Curator of Elementary Instruction*

Other Officers

MARY AVERILL, *Honorary Curator of Japanese Gardening and Floral Art*
HAROLD A. CAPARN, *Consulting Landscape Architect*

RALPH CURTISS BENEDICT, Ph.D., *Resident Investigator (Ferns)*
RALPH H. CHENEY, Sc.D., *Resident Investigator (Economic Plants)*

EMILIE PERPALL CHICHESTER, *Library Assistant*
ELSIE TWEMLOW HAMMOND, M.A., *Instructor*
ELIZABETH MARCY, A.M., *Research Assistant*
FRANCES M. MINER, A.B., *Instructor*
HESTER M. RUSK, A.M., *Instructor*
L. GORDON UTTER, M.S., *Research Assistant*

CHARLES F. DONEY, M.S., *Curatorial Assistant*
WILLIAM H. DURKIN, *Curatorial Assistant*
MARGARET BURDICK PUTZ, *Curatorial Assistant*
MARGERY H. UDELL, *Curatorial Assistant*
HILDA VILKOMERSON, A.B., *Curatorial Assistant*

LOUIS BUHLE, *Photographer*
MAUD H. PURDY, *Artist*

ADMINISTRATIVE

DANIEL C. DOWNS, *Secretary and Accountant*
MAUDE E. VORIS, *Assistant Secretary*
NORMA STOFFEL BANTA, *Office Assistant*

MARIE-LOUISE HUBBARD, A.M., *Secretary to the Director*
GERTRUDE W. MERRILL, A.B., *Field Secretary*
FRANK STOLL, *Registrar and Custodian*

LAURA M. BREWSTER, *Stenographer*
CONSTANCE PURVES ELSON, B.A., *Stenographer*
EVELYN M. GAILER, *Stenographer*

[2] On leave of absence, 1935–36.

FIG. 1. Hempstead Plains, *a natural prairie*. Looking toward Westbury, Long Island.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXV JULY, 1936 NO. 3

THE EARLY VEGETATION OF LONG ISLAND[1]

(A LONG ISLAND TERCENTENARY PUBLICATION)

BY HENRY K. SVENSON

On colonial Long Island, as in other lands under colonization in the seventeenth century, the task of obtaining food and conquering the aborigines seems to have been time-absorbing. Therefore, few observations on the early appearance of the vegetation of Long Island have come down to us, and these observations tend to be generalized and often contradictory, or have the soaring exuberance of the real-estate salesman of that day. Perhaps some of the earliest explorers such as Verrazano touched upon the shores of Long Island, but the first descriptions, and they are meagre, appear to be those of Henry Hudson, who anchored at the western shore of Long Island in September, 1609. Here,[2] "they found the soil of white sand, and a vast number of plum trees loaded with fruit, many of them covered with grape vines of different kinds." Some of his men, landing near Gravesend on September 4th, came back to the ship charmed with their glimpse of the new country and described it as "full of great tall caks, and the land as pleasant to see, with grass and flowers, as they ever had seen."[3] According to Daniel Denton, who lived

[1] Figures 1–5 are from photographs taken by Mr. Louis Buhle on May 26, 1936. Figure 6 is from a photograph taken by Mr. Buhle on August 9, 1915.

[2] Thompson, Benjamin F. *History of Long Island.* Ed. 3, Vol. I, p. 91. New York. 1918.

[3] Flint, Martha B. *Early Long Island,* p. 5. New York. 1896.

at Hempstead in 1670,[1] "The fruits natural to the Island are Mulberries, Posimons, Grapes, great and small. Plumbs of several sorts and Strawberries of such abundance, that in Spring the fields are died red. . . ." A footnote by Miss Flint identifies the mulberry as *Morus rubra,* a native species well developed in the interior, but known only from a few specimens and reaching only a small size on Long Island. It is more than probable that these trees were the white mulberry, *Morus alba,* which was extensively planted in the early days for silkworm culture, some of the early land grants along the Atlantic coast even making obligatory the planting of a certain number of mulberry trees on each partition of land. The extent of mulberry-tree plantings may be estimated by the following excerpts quoted by L. H. Bailey, *Evolution of Our Native Fruits,* p. 145. "If all the highways in country towns were ornamented with a row of mulberry trees, on each side, half a rod apart, each mile would contain 1380 trees, the income of which, after seven years, would probably pay for repairing all the highways and the expenses of the public schools, if the inhabitants would restrain their cattle and sheep from going at large" [Cobb, J. H. *Manual of the Mulberry Tree.* Boston, 1831], and

> In Spring our trees the Caterpillars reare;
> Their trees likewise these noble creatures beare.
> . . . . . .
> They feed not only on the Mulberry
> Which in our World sole food is held to be
> For all such precious Worms of that degree:
> But Poplar, Plum, Crab, Oake, and Apple tree,
> Yea Cherry, and tree called Pohickery.
>
> [Samuel Hartlib. *The Reformed Virginian Silkworm.* 1655.]

Some of the early Long Island nurseries were instrumental in fostering a revival of mulberry-growing for the production of silk, during the period from 1830 to 1840, a venture based this time on the much-extolled *Morus multicaulis,* but ending in a sudden collapse of the mulberry boom and bankruptcy of a large number of horticultural firms and land owners.

To return to Denton's description of the countryside,[2] "The greatest part of the Island is very full of timber, as oaks white

[1] Flint, l.c., p. 40.
[2] Flint, l.c., p. 40.

and red, walnut trees, chestnut trees which yield store of mast for swine, also red maples, cedars, sarsifrage [?sassafras], Beach, Holly, Hazel with many more . . . in May you should see the Woods and Fields so curiously bedeckt with Roses and an innumerable multitude of delightful Flowers not only pleasing to the eye but smell. . . . That you may behold Nature contending With Art and striving to equal if not excel many Gardens in England. . . . One may drive for hours through embowered lanes, between thickets of alder and sumach, overhung with chestnut and oak and pine, or through groves gleaming in spring with the white bloom of the dogwood, glowing in fall with liquidambar and peperidge, with sassafras, and the yellow light of the smooth-shafted tulip tree."

These accounts by Denton give a general idea of the vegetation of Long Island, although there is great variation in the different parts. Long Island is dominated by the great moraine left by the ice sheet of the Wisconsin period,[1] extending from Montauk to Brooklyn. On the moraine and northward to Long Island Sound, the island, especially the western part, was undoubtedly heavily wooded with large timber of an aspect similar to the forests of the Connecticut coast. South of the moraine the huge outwash plain of sand and gravel provided only the most sterile types of soil and was covered mostly with the pitch pine, forming a continuation of the pine barrens of New Jersey. According to reports by Mather and Brockett,[2] the soil of Kings County was more fertile than other parts of the Island: thus "the soil of this county is possessed of greater natural fertility, than that of the other portions of the Island, and it is highly cultivated. It is well adapted to horticulture, and fruits and flowers arrive at great perfection. The grape is extensively cultivated throughout the county. Little timber is found." According to Stiles[3] the earli-

[1] A tablet is placed at a portion of this moraine in the Brooklyn Botanic Garden. See Gager and Antevs. The Story of Our Boulders: Glacial Geology of the Brooklyn Botanic Garden. Brooklyn Bot. Gard. Record **21:** 165–207. 1922.

[2] Mather, J. H. and Brockett, L. P. *Geography of the State of New York,* p. 152. Hartford. 1847.

[3] Stiles, Henry R. *A History of the City of Brooklyn.* Vol. 1, p. 23. Brooklyn. 1867.

est recorded grant in the County of Kings was made in June, 1636, to Jacob Van Corlaer, who purchased from the Indians a flat of land between the North River and the East River. These "flats" which upon cultivation were incorporated into the village of "New Amersfoort" in the Flatlands, were, according to Stiles, "miniature prairies, devoid of trees, and having a dark-colored surface soil; and having undergone a certain rude culture by the Indians, were ready, without much previous toil, for the plough. On this account they were most sought for, and first purchased by the original settlers, who being natives of the low and level lands of Holland and Belgium, were inexperienced in the clearing of forests." As to the kinds of trees which were on these lands, we have only occasional surveyors' reports such as the following [Stiles, p. 51]: "I have surveyed [9th January, 1695] for Adriaen Bennett a certain parcel of land . . . it runs alongst the said lane and markt trees to a certain chestnut standing on the top of the hill, marked with three notches, and thence to a black oak standing on the south side of the said hill." In commenting on the early names of Long Island (Mectowacks, Seawanhacky ,etc., all meaning "Island of Shells"), Thompson (l.c., p. 94) mentions that "the land was in most places destitute of timber."

The vegetation of Queens County, as stated by Mather and Brockett (l.c, p. 160) was "principally oak, hickory, chestnut and locust [1] in great abundance. In the northern part, the apple, pear, peach, cherry, &c., thrive well. Wheat, corn, and grass, are also favorite crops."

Farther to the eastward, where the suburban developments of Garden City, Hempstead, and Mineola now spread themselves out, there can be seen portions (fig. 1) of the Hempstead Plain, a treeless area of natural prairie originally sixteen miles in length and covering sixty thousand acres. The soil, as described by Flint (p. 19) was "too porous to be plowed," and "no attempt was made at cultivation until within a hundred years, when it was

[1] The locust tree is not native to Long Island, but according to reports, was brought from Virginia at an early date. It has established itself exceedingly well, spreading into dense thickets which have the appearance of a native growth. A recently recognized variety, especially abundant on Long Island, has exceptional height and the wood is unusually durable when in contact with the soil (see B. Y. Morrison. *Science*. Oct. 4, 1935).

FIG. 2. Pine barrens with undergrowth of dwarf oak (*Quercus ilicifolia*). Yaphank, Long Island.

first enclosed as farms." "The grass formerly grew to the height of five or six feet, but the earliest variety—Secretary grass—was short and fine, making a very thick, tough sod, which required two yokes of oxen in breaking it up." For a long time these plains were common pasturage, and they became not only the center of the wool-raising industry on Long Island, but also, from the earliest times, due to their level stoneless expanse, they were a meeting-ground for horse-racing. Daniel M. Tredwell (*Reminiscences of Long Island*, p. 91. Brooklyn. 1912) describes the plains as a "territory reserved by the original, or in the original grants or patents, to the inhabitants of the town for pasturage of cattle and sheep, and in the early days of the colony thousands of cattle and sheep were pastured there. The further privilege was granted to every freeholder of cutting grass on said plains. The commissioners of highways were required to keep open the means of access to the public watering places, and for the purpose of looking after the interest of freeholders who patronized the public lands. . . ."

These plains are to the present day covered by an exceedingly hard turf of beard grass (*Andropogon scoparius*), the firmness of which has probably been to a large extent instrumental in preventing the growth of trees. Where this turf has been broken through, young black cherries and poplars often put in their appearance. In the spring great areas of these plains have a blue tinge due to the flowers of *Viola pedata*; with these are often associated the pink polygala (*Polygala polygama*), blue-eyed-grass (*Sisyrinchium*), and the basal rosettes of *Aletris farinosa*. Clumps of wild indigo (*Baptisia tinctoria*) and the dwarf willow (*Salix tristis*), stand out as knob-like projections on these plains. These species have been discussed in some detail in the study of the Hempstead Plains by Henry Hicks,[1] who states (p. 9) that the grass was probably very much taller originally than at present, this contention being expressed by such phrases as "a man might miss his way in the tall grass" and "cattle lying down in the grass were lost to sight." Vertical sections of the plains (p. 6) show "first a thick and firm turf in black soil over a layer of yellow

[1] Ms. copy: "The Flora of the Hempstead Plains" (1892), in the library of the Brooklyn Botanic Garden.

loam, underlaid to great depths by quartz gravel and sand disposed in small and thin strata, as if deposited by rapid currents. . . . Through this material the water of rainfall rapidly descends to the spring level. . . . This perfect drainage together with the thinness of the surface soil and the general climate largely determines the character of the flora on the Plains and the Pine-barrens to the eastward."

The Plains have been more recently discussed by Roland M. Harper.[1] "This prairie," he says (p. 277), "known locally as the 'Hempstead Plains,' is mentioned in a few historical and descriptive works, but long before geography became a science it had ceased to excite the wonder of the inhabitants, few of whom at the present time realize that there is not another place exactly like it in the world. . . . The upland vegetation of the Plains comprises about four species of trees, a dozen shrubs, sixty herbs, and a few mosses, lichens and fungi. . . . Our prairie is subject to a good deal of grazing, frequent fires, strong wind, and excessive evaporation, like the western ones, but these factors are the result rather than the cause of treelessness, so that they could hardly have determined the prairie in the beginning nor fixed its present boundaries. . . . Even if no more of this land were taken up in farms, the continued growth of New York City is bound to cover it all with houses sooner or later."

East of the Hempstead Plains and covering the larger part of the island stretches a great waste of pine-covered barren, interrupted here and there by solid and impenetrable thickets of dwarf oak (*Quercus ilicifolia, Q. prinoides*), scarcely more than knee high (fig. 2); at intervals, as in the region south of Port Jefferson (fig. 3) there are openings of clean white sand, inhabited by the blue lupine, clumps of yellow *Hudsonia*, and trailing vines of "deer food" (*Arctostaphylos Uva-Ursi*); an area comparatively recently described by Thompson (p. 24) as "almost entirely in its wild native state and no house or hut is to be seen for many miles." These barrens, extending eastward until they meet the open downs of the seacoast, have an appearance identical with the

[1] The Hempstead Plains. A Natural Prairie on Long Island. *Bull. Amer. Geog. Soc.* **43**: 351–360. 1911. The Hempstead Plains of Long Island. *Torreya* **12**: 277. 1912. The vegetation of the Hempstead plains. *Mem. Torrey Bot. Club* **17**: 262–286. 1918.

FIG. 3. Pine barrens (*Pinus rigida*) at Coram, Long Island. *Hudsonia* in the foreground.

wilderness surrounding the Pilgrim settlements at Plymouth, and as in the Plymouth wilderness, they are dotted with clear sand-rimmed ponds. For the largest of these (Lake Ronkonkoma) "the Indians had a most superstitious reverence." [1] Bailey,[2] in describing the cranberry-growing region of Plymouth County, so clearly depicts an area similar to that of eastern Long Island that I have included here a part of his description.

"This Cape Cod region is but a part of the sandy waste which stretches southward and westward through Nantucket, along the north shore of the Sound and throughout a large part of Long Island; and essentially the same formation is continued along the Jersey seaboard. Here the sea-coast vegetation meets the thickets of alder and bayberry and sweet fern, with their dashes of wild roses and viburnums. And in sheltered ponds the sweet water-lily grows with rushes and pondweeds in the most delightful abandon. In the warm and sandy glades two kinds of dwarf oak grow in profusion, bearing their multitude of acorns upon bushes scarcely as high as one's head. . . . But while we are busy with our expectations, we are plunging into a wilderness,—not a second growth, half-civilized forest, but a primitive waste of sand and pitch-pines and oaks!"

The Long Island pine barrens extend eastwardly to the wind-swept Shinnecock Hills which "assume some permanence of form, held together by a coarse, wiry grass, but sustaining only the stunted bayberry, the beach plum, and the dwarfed red cedar," [3] and James Truslow Adams,[4] has unearthed some older descriptions of these hills "composed almost entirely of fine sand, . . . drifted hither and thither by the winds . . . perfectly naked except extensive patches of whortle berry, bay berry and other small shrubs. A succession of . . . sand hills, like the ground mentioned in the description of Cape Cod, . . . exhibit a desolate and melancholy aspect."

At the very eastern extremity of the Island, a little more than a hundred miles from the early Dutch settlements, an isolated prom-

[1] Flint, p. 24.

[2] Bailey, L. H. *Evolution of Our Native Fruits*, p. 414–424. 1911. Also in *American Garden*, October, 1890.

[3] Flint, p. 27.

[4] *History of Southampton*. Bridgehampton. 1918.

ontory juts out into the Atlantic, known from the earliest times as Montauk. To quote from the extensive descriptions by Norman Taylor [1] (p. 9): "Casual visitors to Montauk are charmed by the wildness of the place, the desolate moor-like Downs, the depths of the kettleholes, some destitute of woody vegetation, others dark and even mysterious in their wooded interior. The feeling that the vegetation has always been so, and that from the earliest times the Indians, whose relics are common enough on the Point, must have roamed through a region such as our modern pedestrian sees, is natural enough. While this may be wholly true, it appears from a study of the records of the earliest settlers that there has always been, within historic times at least, a distinct separation of grassland and woodland. Woody vegetation (p. 28) on these wind-swept hills appears next to impossible, and yet there are evidences that some form of woody vegetation is making an attempt to cover at least part of what is now grassland. There are today hundreds of tiny patches of 'bush' scattered over the Downs, some only a foot or two in diameter, others covering, especially in the lee, square rods in extent . . . little islands of thicket in an ocean of grassland. Almost without exception, the major portion of these islands is made up of the Bayberry (*Myrica carolinensis*), very often associated with which will be *Rosa carolina,* and perhaps the whole mass bound together with *Rubus procumbens* (which often scrambles out into the grassland), or *Smilax glauca.* It is not without interest that both these binders make prickly forage, and that in nearly every one of hundreds of such patches of 'bush' that were examined, one or both of these vines was to be found. Both the Rose and the Bayberry, under normal circumstances, would be several feet tall, here they are rarely more than a foot. There are scores of places where the wind keeps these flattened down so that while the patch of bushes may be many feet across, the shrubs will be only six inches high. . . . From this stage in the development of a patch, which may start with a single sprig of Bayberry, and end with a forlorn and stunted tree in the center of it, no one knows how long a time may have elapsed."

In the preceding attempts to give an idea of the vegetation which confronted the early colonists, and, to some extent, a picture of the

[1] The Vegetation of Montauk: A Study of Grassland and Forest. *Brooklyn Bot. Gard. Memoirs.* Vol. 2, part 1. 1923.

FIG. 4. Pine barrens (*Pinus rigida*) north of Patchogue, Long Island.

plants covering Long Island at the present time, it is fortunately comparatively easy to determine which plants were native to Long Island, and which were introduced consciously or unconsciously by the early settlers, although the actual time of introduction is for the most part lost in obscurity. It is not hard to designate those waifs which have come to Long Island as stowaways in boat ballast or as derelict seeds destined to spring up in the crop plantings. Such an enumeration always brings surprise to those who are not botanists, since it includes common European wayside plants not native to America, such as dandelions, daisies, clovers, and buttercups, burdock, wild carrot, chicory, and most of the field grasses. The plantain was long known to Indians as the "white man's footstep." The recently introduced Japanese honeysuckle, however, gives promise of becoming our worst pest, and its behavior on Long Island is much as described by Professor Fernald,[1] "The ubiquitous and unrestrained Japanese Honeysuckle, *Lonicera japonica*, is doing its utmost to strangle everything which originally grew in the borders of wooded swamps and thickets. Even the strongly armored species of *Smilax* become hopelessly entangled by it and more delicate shrubs and herbs are soon obliterated. If the 'C. C. C.' survives, nothing more beneficial to future generations in our southeast could be devised than a vigorous warfare against the Japanese Honeysuckle."

Those plants which, like the passenger pigeon, have entirely disappeared from Long Island do not as yet make a formidable list. As far as known, only two species of interest have been lost, although with the constant draining of swamps and marshes and continued cutting of woodlands, many more are doomed to follow. Of these two plants the most interesting is a species of Clematis (*C. ochroleuca*) at one time cited by Torrey[2] as growing "in a small sandy copse about half a mile from the South Ferry, Brooklyn; the only known locality of the plant in the state." It is described by Spingarn[3] as "a herbaceous perennial species, one to two feet high, growing from Staten Island, New York, to Georgia, with entire, ovate leaves and solitary, cream-colored or yellowish-

[1] *Rhodora* **37**: 380. 1935.

[2] *Flora of New York.* Vol. 2, p. 6. 1843.

[3] American Clematis for American Gardens. *Nat. Horticultural Mag.*, p. 86. January, 1934.

white flowers (with or without a purple tinge) in spring; found usually in shale or serpentine; an interesting plant for the rock garden or wild garden." The few existing plants on Staten Island, growing in a locality discovered since Torrey's report, are seriously threatened by building, and in a few years this interesting and beautiful plant will cease to be a representative of the New York vegetation. The second of interest is the twin-flower (*Linnaea borealis* var. *americana*), a northern plant found in a swamp at Babylon in 1871, but otherwise unknown from Long Island.

There are two additional plants on Long Island which deserve mention. A single specimen of the Cloudberry or Bake-Apple berry (*Rubus Chamaemorus*), a well-known little plant in northern Europe and Canada, with fruit like a golden-yellow raspberry, was collected at Montauk by Dr. William Braislin, of Brooklyn, in 1908. Taylor [1] makes the following comment: "Diligent search has since followed to disclose this plant, that at Montauk is hundreds of miles south of its true home. Migratory birds, known to make overnight flights from Labrador to Montauk, are supposed to be responsible for its introduction." Associated with, or at least not far from the cloudberry, a small patch of the Arctic Crowberry (*Empetrum nigrum*) persisted on the downs of Montauk up to a few years ago, and perhaps still remains there.

In discussing plants of value to the early settlers, the trees are of first importance. Reference has been made to Denton's early account of timber on Long Island [see p. 208]. Then, as now, the most abundant tree was probably the pitch pine (*Pinus rigida*) (fig. 4), occupying vast barrens from Hempstead Plains to the eastern shore of Long Island. As a timber tree it was almost worthless, but had great value as a source of charcoal, turpentine and pitch. The pine barrens have been badly cut and fire-swept, and most of the early forests are now represented only by a few blackened spars protruding from the thickets. White pine (*Pinus Strobus*), a tree so valuable for timber in New England that it was utilized even for ship masts, was of rare and restricted occurrence on Long Island, but is believed to have been native in the vicinity of Sag Harbor. The oaks, white and red and black, all of which are still abundant on the Island, probably furnished the great sup-

[1] *Brooklyn Bot. Gard. Memoirs.* Vol. 2, part I, p. 24. 1923.

ply of building timber, and the acorns of the white oak, containing much less tannin than those of the black oak, were probably of value as food for turkeys and hogs, as well as for the Indians. From the Earl of Strafford's letters and dispatches [see Flint, p. 36], "There are fayre Turkeys far greater than heere, 500 in flocks with infinite stores of Berries, Chestnuts, Beechnuts and Mast wch they feed on." Remains of the curious fences made by cutting and bending oak trees are still to be found on Long Island (fig. 5), as described by Flint (p. 29): "In eastern Suffolk a unique form of hedgerow is common, at once picturesque and distinctive. It is formed by cutting down the oaks or chestnuts leaving the stumps and prone bodies of the trees to form a line of rude fence. The sprouts are then allowed to grow up, and their contorted branches interlaced with blackberry and greenbrier form an impenetrable barrier. They, in their turn, are cut and recut, until the hedge becomes several feet in thickness."

The white or swamp cedar (fig. 6) now almost extinct on Long Island, seems at one time to have had a fairly wide range, for we read in Thompson (p. 50): "An extensive marsh of peat, which is probably deep and of fine quality, lies near the road from Williamsburgh to Jamaica, and is called the Cedar Swamp." The white cedar, chiefly of coastal-plain distribution, forms huge swamps in New Jersey and extends inland to the New Jersey highlands and even to central New Hampshire. It is not to be confused with the more common red cedar, the wood of which is in great demand for lead pencils and cedar chests. The well-known spire-like red cedar trees, abundant on Long Island, are quite different in appearance from the typical red cedars of the southern states, and constitute the recently recognized var. *crebra* Fernald and Griscom,[1] differing not only in their spire-like outline but also in the shallow pitting of the seeds. Another timber tree of interest was the tulip tree (*Liriodendron*), a specimen near Success Pond mentioned by Miss Flint as being 26 feet in circumference. The sour gum or pepperidge (*Nyssa sylvatica*), usually a tree of swamps, was also of some importance.

There were a number of plants which furnished useful substances. Perhaps the best known of these is the bayberry or

[1] *Rhodora* **37**: 133. 1935.

FIG. 5. Remains of old boundary-line fence of white oaks near Selden, Long Island.

candleberry (*Myrica carolinensis*), which produced wax-covered berries used for making candles. This wax, constituting about ten percent of the weight of the berry, was separated by boiling in water. "Throughout the Island the bayberry or candleberry was of recognized value. The town laws of Brookhaven, in 1687, forbade the gathering of the berries before September 15th, under penalty of a fine of fifteen shillings." (Flint, p. 27.) Sassafras was one of the most sought-for substances in the early days, but the abundance of the product and its little value as medicine quickly reduced the demand. Jacob Bigelow, in his *Medical Botany,* 1819 (p. 142) comments as follows: "it seems to have been one of the earliest trees of the North American continent to attract the attention of Europeans. Its character as an article of medicine was at one time so high, that it commanded an extravagant price, and treatises were written to celebrate its virtues. The flavor of the root is most powerful, that of the branches more pleasant. The flavor and odour reside in a volatile oil which is readily obtained from the bark by distillation." A third product of similar interest was the oil of checkerberry or wintergreen, derived from a dwarf plant (*Gaultheria procumbens*) abundant throughout the pine barrens of Long Island, and still extensively used for flavoring and in medicine.

The plants of Long Island provided but little for the manufacture of clothing, the species of most value in this respect being perhaps the milkweed (*Asclepias syriaca*) of which Bigelow (p. 88) says: "Its chief uses were for beds, cloth, hats and paper. It was found that from eight to nine pounds of the silk occupied a space of from five to six cubic feet, and were sufficient for a bed, coverlet, and two pillows.—The shortness of the fibre prevented it from being spun and woven alone. . . . A plantation containing thirty thousand plants yielded from six hundred to eight hundred pounds of silk."

But the food plants of a region are, after all, of the greatest interest, and of the native fruits the colonists seem to have been most impressed by the strawberries and whortleberries. According to early reports the wild strawberry was both larger and more abundant than at the present time, and brought forth the following comment from Roger Williams [Bailey, *Sketch of the Evolution of*

Our Native Fruits, p. 426] : " This berry is the wonder of all the fruits growing naturally in those parts; it is of itself excellent, so that one of the chiefest doctors of England was wont to say that God could have made, but never did, a better berry. . . . In some parts, where the natives have planted, I have many times seen as many as would fill a good ship within a few miles' compasse. The Indians bruise them in a mottar and mixe them with meale and make Strawberry bread."

There was great abundance and variety of whortleberries and bilberries, better known to us as " huckleberries " and " blueberries," which contrasted with the small sour species of Europe, such as the Bog Bilberry (*Vaccinium uliginosum*), found in New York on the summits of the Adirondack Mountains.

These names persisted until fairly late; thus Mather and Brockett write in 1847 (l.c. p. 35), " The earliest in the markets is the dwarf blue Whortleberry (*V. Pennsylvanicum*), growing in sandy woods, and on hill sides and summits of the mountains. The Bilberry (*V. corymbosum*) is frequent in swamps and wet shady woods. The agreeable acid Cranberry, an almost indispensable article of food, is the fruit of two species of Vaccinium (*V. Oxycoccus* and *V. macrocarpon*). The former abounds in the northern and western parts of the state, and the latter, which is the common American cranberry seen in the market, is most frequent in the south."

The term " huckleberry," a corruption of " whortleberry," is now rigorously applied in parts of New England to *Gaylussacia baccata,* a resinous-fruited species of dry barrens, having ten large stony seeds, whereas the " blueberries " (*Vaccinium* species) have many small seeds. In states to the westward no distinction is ordinarily made, all species being called " huckleberries."

Of the species native to Long Island, by far the most important is the High-bush Blueberry (*V. corymbosum*), forming bushes four to eight feet high, a species now extensively cultivated in southern New Jersey. Undoubtedly next in importance on Long Island is the Late Low Blueberry (*V. vacillans*), a low shrub with yellowish-green branches and exceedingly sweet berries covered with a light bluish bloom. A third species, more common northward, is the Low Blueberry (*V. pennsylvanicum*), which consti-

tutes most of the commercial blueberry crop of Maine and Nova Scotia. The huckleberry (*Gaylussacia baccata*), is very abundant throughout the barrens, and the Dangleberry (*G. frondosa*), with sour, light-blue berries on long stalks, ripening late, is fairly common in thickets on Long Island, and, according to Emerson (p. 452), "where it is procured in sufficient quantities . . . it is used for puddings." A third species of huckleberry (*G. dumosa*), with slightly prickly fruit, occasional in open bogs on Long Island, has sweet juicy berries which are very palatable. Closely related to the blueberries and probably of greater importance are the cranberries. "The berries are gathered in great quantities, and used for making tarts and sauce, for which purpose they are superior to any other article, especially as they have the advantage of being kept without difficulty throughout the winter."[1] The large cranberry (*Vaccinium macrocarpon*) is abundant in sandy bogs on Long Island and has given rise to the cultivated strains of berries; the small cranberry (*V. Oxycoccus*), a more northern species known also in Europe and producing very small fruit, appears to be restricted to two localities on Long Island.

Probably, as in other places, there was overwhelming interest in wine-making, and the native species of grapes on Long Island (chiefly *Vitis Labrusca, V. aestivalis,* and *V. cordifolia*) were undoubtedly utilized for this purpose without crowning success, and, if we may judge from the tastes of the Massachusetts colonists "the appetite for such wine does not seem perilous."[2] Out of these native grapes, however, came eventualy such valuable fruit as the Concord, Catawba, and Isabella.[3] "This American grape is much unlike the European fruit. It is essentially a table fruit, whereas the other is a wine fruit. European writings treat of the vine, but American writings speak of grapes." [Bailey, p. 1.]

[1] Emerson, George B. *A Report on the Trees and Shrubs Growing Naturally in the Forests of Massachusetts,* p. 406. Boston, 1846. Edition II. Vol. II, p. 459. Boston, 1875.

[2] Bailey, l.c., p. 2.

[3] "It was introduced into New York by Mrs. Isabella Gibbs, of Brooklyn, from whom it passed to William Robert Prince, and for whom he named it the Isabella. This was the third great American grape in point of historical importance, and it is another offshoot of the wild foxgrape, *Vitis Labrusca.*" [Bailey, l.c., p. 66.]

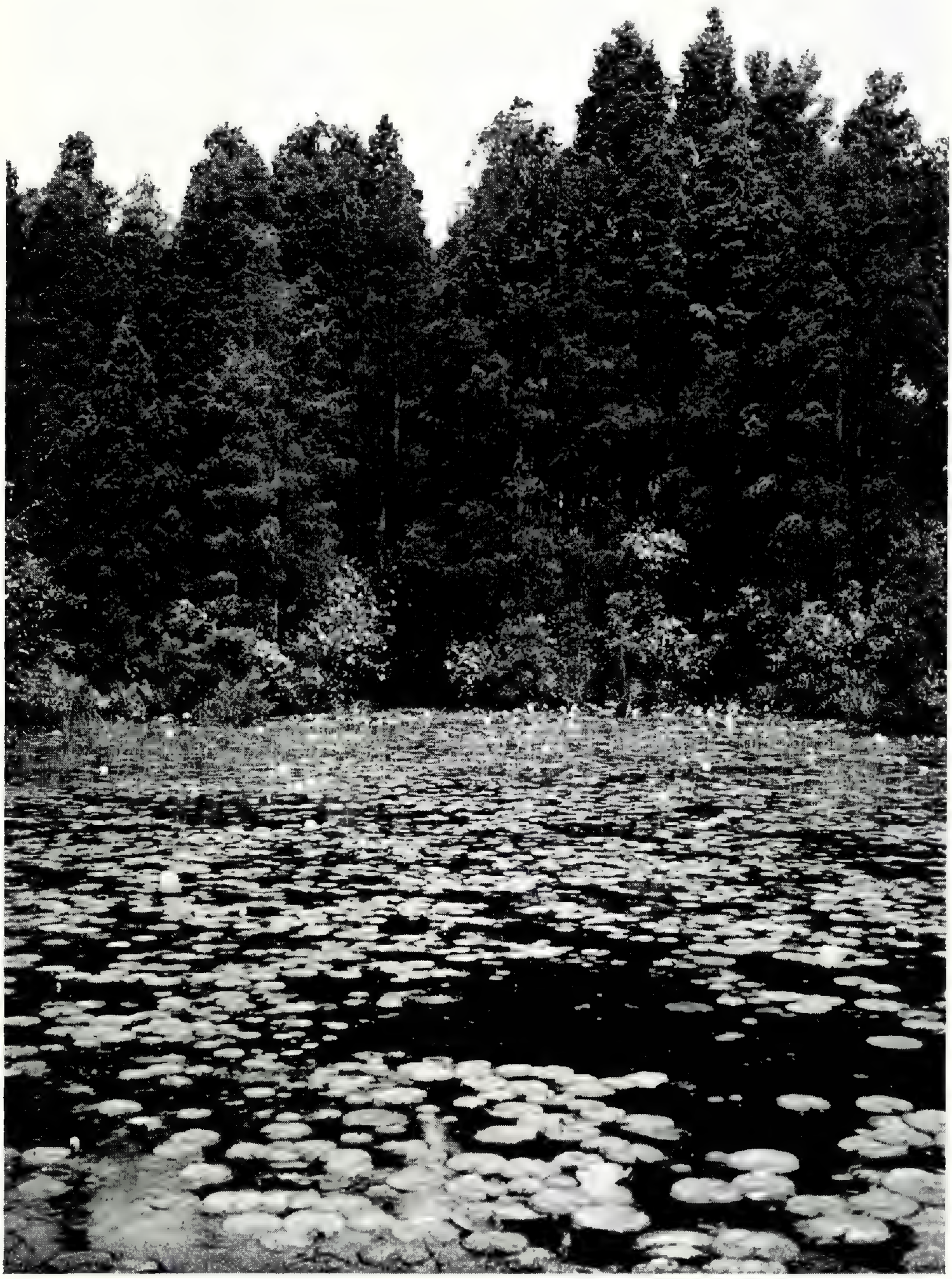


FIG. 6. White or Swamp Cedar (*Chamaecyparis thyoides*) at upper end of swamp, near Merrick, Long Island. Condition as in August, 1915. This swamp has since been drained.

The only plum on Long Island of value for food is the beach plum (*Prunus maritima*), characteristic of the coastal sands, and bearing yellowish to dull purple fruit about a half inch in diameter. "The Plummes of the Countrey be better for Plumbs than the Cherries be for Cherries; they be blacke and yellow, about the bignesse of a Damson, of a reasonable good taste." [Wm. Wood, in *New England Prospect*, 1634.] Thus the cherries were nothing to boast about, and the reader will probably recognize immediately the well-known choke-cherry (*Prunus virginiana*) in Wood's description, "The Cherrie trees yeeld great store of Cherries which grow on clusters like grapes; they be much smaller than our English Cherrie, nothing neare so good if they be not fully ripe, they so furre the mouth that the tongue will cleave to the roofe." The wild black cherry or rum cherry (*Prunus serotina*) served a variety of purposes, infusions of the bark being used for medicinal purposes, and the fruit in making cherry brandy, or flavoring rum. The wood was of exceptional value in furniture construction. *Amelanchier stolonifera*, known locally on Cape Cod as "swamp cherry" might be classified here, though more commonly known as shad-bush or June-berry. Since the fruits are sometimes used for making pies on Cape Cod, there is some probability that they had a similar use on eastern Long Island.

For final consideration, there is the group of nut-bearing trees, which gave the settlers opportunity for rumination during the winter months. Probably of greatest importance was the black walnut (*Juglans nigra*), a tree often of gigantic proportions, a specimen at Roslyn,[1] Long Island, mentioned by Miss Flint (p. 29), being "one hundred and fifty feet in height with a circumference of thirty feet." In addition to wood of outstanding value in furniture making, it produced a hard nut nearly resembling the English walnut in shape, but with a more oily kernel. The butternut (*Juglans cinerea*), is less frequent on Long Island than to the northward, but it supplied, in addition to the nuts, a strong and durable yellow dye much used in the early days, and furthermore produced a sap from which sugar could be made (according to Bigelow, p. 118). Of the three hickories present on Long Is-

[1] This tree, which grew near the home of William Cullen Bryant, is illustrated by Emerson, l.c., Ed. 2, vol. I, p. 211. 1875.

land, the shag-bark or shell-bark (*Carya ovata*) was by far the most valuable, both for its strong wood and delicious nuts; the mocker nut (*Carya alba*) and pig nut (*Carya glabra*) being much inferior in both respects. Mention should also be made of the groves of beech trees, with great stores of beech nuts, and of the abundance of the American chestnut, a species now existing on Long Island only in the form of dwarf stump-shoots, owing to the ravages of the chestnut blight, a fungus disease that became epidemic on Long Island about thirty years ago. The breeding experiments of Dr. Arthur H. Graves, of the Brooklyn Botanic Garden, with hybrids of the American and Japanese chestnuts, may, it is hoped, bring to Long Island a re-establishment of this valuable tree. There also is hope that the better and most representative woodlands now existing on Long Island may be preserved by legislative action, giving to future generations some idea, however much diluted, of the appearance of Long Island in early colonial days.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President
EDWARD C. BLUM

First Vice-President
WALTER H. CRITTENDEN

Second Vice-President
ADRIAN VAN SINDEREN

Third Vice-President
SUMNER FORD

Treasurer
EDWIN P. MAYNARD

Secretary
JOHN H. DENBIGH

Botanic Garden Governing Committee

MISS HILDA LOINES, *Chairman*

PHILIP A. BENSON
EDWARD C. BLUM, *Ex officio*
MRS. WILLIAM H. CARY
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
MRS. LEWIS W. FRANCIS
WILLIAM T. HUNTER
EDWIN P. MAYNARD
ALFRED E. MUDGE

Ex Officio Members of the Board

The Following Officials of the City of New York

THE MAYOR
THE COMPTROLLER
THE COMMISSIONER OF PARKS

GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 69. Plants of the Astor Expedition, 1930 (Galapagos and Cocos Islands). 61 pages. 1935.

No. 70. Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag oats. 10 pages. 1935.

No. 71. Physiologic specialization of the parasitic fungi. 19 pages. 1935.

No. 73. Studies of the root nodule organisms of certain wild legumes. 19 pages. 1936.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

SEP 4 - 1936

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXV OCTOBER, 1936 NO. 4

PROSPECTUS

OF COURSES, LECTURES, AND OTHER EDUCATIONAL
ADVANTAGES OFFERED TO MEMBERS AND TO
THE GENERAL PUBLIC

1936-37

PUBLISHED QUARTERLY
AT PRINCE AND LEMON STS., LANCASTER, PA.
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

Entered as second-class matter in the post-office at Lancaster, Pa., under act of August 24, 1912.

BROOKLYN BOTANIC GARDEN

Scientific, Educational, and Administrative Officers

SCIENTIFIC AND EDUCATIONAL

The Staff

C. STUART GAGER, Ph.D., Sc.D., Pd.D., *Director*
MONTAGUE FREE, Certificate, Royal Botanic Gardens, Kew, *Horticulturist*
ARTHUR HARMOUNT GRAVES, Ph.D., *Curator of Public Instruction*
ALFRED GUNDERSEN, Docteur de l'Université (Paris), *Curator of Plants*
WILLIAM E. JORDAN, B.S., *Librarian*
GEORGE M. REED, Ph.D., *Curator of Plant Pathology*
ELLEN EDDY SHAW, B.S., *Curator of Elementary Instruction*
HENRY K. SVENSON, Ph.D., *Curator of the Herbarium*
MARGARET M. DORWARD, A.B., *Assistant Curator of Elementary Instruction*

Other Officers

MARY AVERILL, *Honorary Curator of Japanese Gardening and Floral Art*
HAROLD A. CAPARN, *Consulting Landscape Architect*

RALPH CURTISS BENEDICT, Ph.D., *Resident Investigator (Ferns)*
RALPH H. CHENEY, Sc.D., *Resident Investigator (Economic Plants)*

EMILIE PERPALL CHICHESTER, *Library Assistant*
ELSIE TWEMLOW HAMMOND, M.A., *Instructor*
ELIZABETH MARCY, A.M., *Research Assistant*
FRANCES M. MINER, A.B., *Instructor*
HESTER M. RUSK, A.M., *Instructor*
L. GORDON UTTER, M.S., *Research Assistant*

CHARLES F. DONEY, M.S., *Curatorial Assistant*
WILLIAM H. DURKIN, *Curatorial Assistant*
MARGARET BURDICK PUTZ, *Curatorial Assistant*
MARGERY H. UDELL, *Curatorial Assistant*
HILDA VILKOMERSON, A.B., *Curatorial Assistant*

LOUIS BUHLE, *Photographer*
MAUD H. PURDY, *Artist*

ADMINISTRATIVE

DANIEL C. DOWNS, *Secretary and Accountant*
MAUDE E. VORIS, *Assistant Secretary*
NORMA STOFFEL BANTA, *Office Assistant*

MARIE-LOUISE HUBBARD, A.M., *Secretary to the Director*
GERTRUDE W. MERRILL, A.B., *Field Secretary*
FRANK STOLL, *Registrar and Custodian*

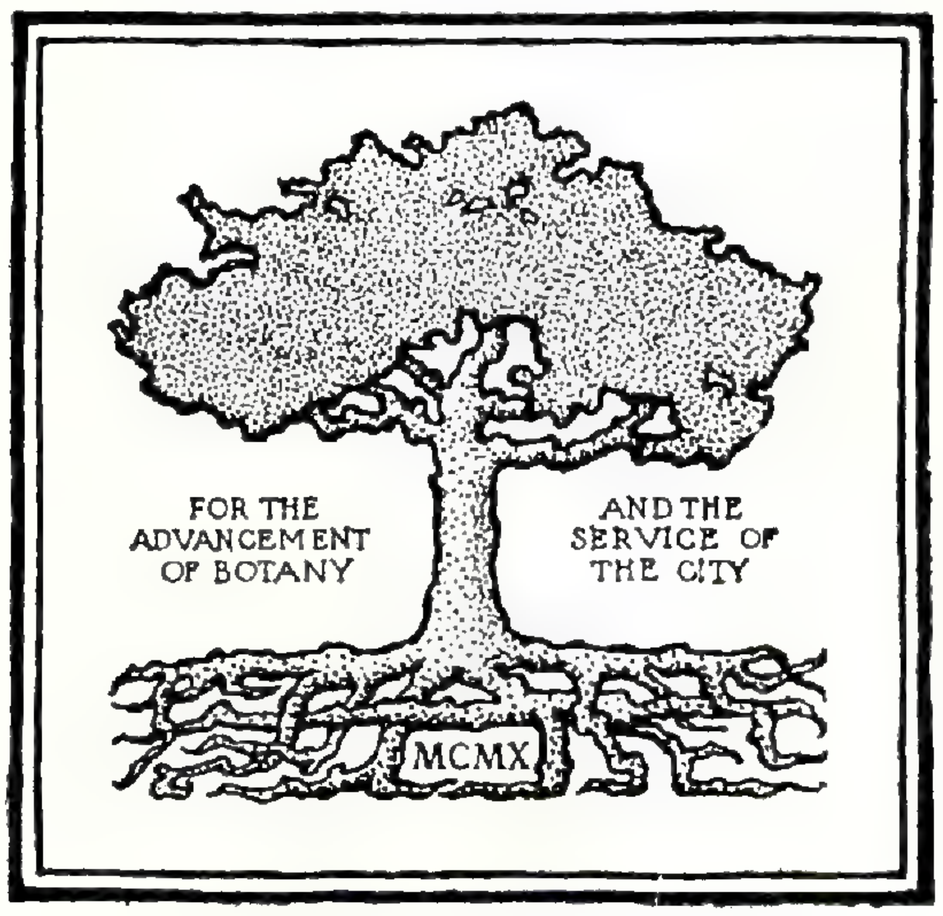
LAURA M. BREWSTER, *Stenographer*
CONSTANCE PURVES ELSON, B.A., *Stenographer*
EVELYN M. GAILER, *Stenographer*

BROOKLYN BOTANIC GARDEN

RECORD

EDITED BY

C. STUART GAGER



VOLUME XXV

1936

PUBLISHED QUARTERLY

AT PRINCE AND LEMON STREETS, LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN, N. Y.

LANCASTER PRESS, INC., LANCASTER, PA.

TABLE OF CONTENTS OF VOLUME XXV

No. 1, January

Delectus Seminum, Brooklyn 1935 (List of Seeds Offered in Exchange) 1

No. 2, April

The Botanic Garden and the City ..... Preceding page 11
Information Concerning Membership ..... Preceding page 11
Privileges of Membership ..... Preceding page 11
Forms of Bequest to the Brooklyn Botanic Garden ... Preceding page 11
Twenty-Fifth Anniversary Group at Brooklyn Botanic Garden, May 15, 1935 ..... Preceding page 11
Twenty-Fifth Annual Report of the Brooklyn Botanic Garden, 1935.. 11
Report of the Director 11
Reports on Research for 1935 45
Report of the Curator of Public Instruction 78
Report of the Curator of Elementary Instruction 91
Report of the Curator of Plants 99
Report of the Curator of the Herbarium 105
Report of the Horticulturist and Head Gardener 115
Report on the Library 123
Statistical Report on the Library 129
Report of the Resident Investigator (Ferns) 130
Report of the Resident Investigator (Economic Plants) 132
Financial Statement for 1935 133
1. Tax Budget Accounts 133
2. Private Funds Accounts 135
3. Summary of Total Maintenance Budget for 1935 140
Gifts Received During 1935 141
Publications by the Botanic Garden Personnel During 1935 150
Talks, Lectures, Addresses, and Papers Given During 1935 154
Radio Talks by the Botanic Garden Personnel During 1935 161
Field Trips Conducted 163
Meetings of Organizations at the Garden, 1935 163
Report on Photographic Work 165
Report on Brooklyn Botanic Garden Publications, 1935 165
American Journal of Botany and the Brooklyn Botanic Garden 167
American Journal of Botany: Report of the Business Manager for the Period January 1, 1914 to December 31, 1935 169
Twenty-Fifth Anniversary of the Brooklyn Botanic Garden (Program) 174

Sponsoring Committee for the Twenty-Fifth Anniversary 183
Announcements: Address delivered at the Twenty-Fifth Anniversary 185
Officers of the Board of Trustees 190
Members of the Board 191
Woman's Auxiliary 192
List of Members 193
Summary of Membership 206

No. 3, July

The Early Vegetation of Long Island 207

No. 4, October

Prospectus: 1936–37 229
Information Concerning Membership v
Privileges of Membership vi
Out-of-Town Membership Privileges vii
Regulations Concerning Photographing, Painting, and Sketching .. viii
General Information Concerning the Activities of the Brooklyn Botanic Garden ix
Cooperation with Local Schools 229
Bureau of Public Information 233
Docentry 234
Meetings of Outside Organizations 234
Courses of Instruction 234
Miscellaneous 245
Other Educational Features 248
Index to Volume XXV 259

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual member	$ 10
2.	Sustaining member	25
3.	Life member	500
4.	Permanent member	2,500
5.	Donor	10,000
6.	Patron	25,000
7.	Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden. (See the following page.)

OUT–OF–TOWN MEMBERSHIP PRIVILEGES

In accordance with a cooperative arrangement with a number of other institutions and organizations, Brooklyn Botanic Garden members, when visiting other cities, may, on presentation of their Botanic Garden membership card at the office of the cooperating museum or organization, be accorded, without charge, the same privileges as are enjoyed by the members of that institution, including admission to exhibits and lectures, and invitation to social events. This does not include being enrolled on the mailing list for publications, and does not include free admission to the Philadelphia and Boston spring Flower Shows.

In reciprocation, the members of the cooperating units, when visiting the Metropolitan district of Greater New York, will be accorded full membership privileges at the Brooklyn Botanic Garden.

The cooperating units are as follows:

Academy of Natural Sciences, Philadelphia, Pa.
Berkshire Museum, Springfield, Mass.
Boston Society of Natural History, Boston, Mass.
Buffalo Museum of Science, Buffalo, N. Y.
California Academy of Sciences, San Francisco.
Carnegie Museum, Pittsburgh, Pa.
Charleston Museum, Charleston, S. C.
Everhart Museum of Natural History, Science and Art, Scranton, Pa.
Fairbanks Museum of Natural Science, St. Johnsbury, Vt.
Field Museum of Natural History, Chicago, Ill.
Los Angeles Museum, Los Angeles, Calif.
Massachusetts Horticultural Society, Boston, Mass.
Missouri Botanical Garden, St. Louis, Mo.
Newark Museum, Newark, N. J.
New York State Museum, Albany, N. Y.
Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
Pennsylvania Horticultural Society, Philadelphia, Pa.
Philadelphia Commercial Museum, Philadelphia, Pa.
Southwest Museum, Los Angeles, California.

REGULATIONS CONCERNING PHOTOGRAPHING, PAINTING, AND SKETCHING

1. No permit is required for photographing with a hand camera, or for sketching or painting without an easel on the Grounds or in the Conservatories.

2. Sketching and painting with an easel and the use of a tripod camera are not allowed in the Japanese Garden, the Rose Garden, the Local Flora Section (Native Wild Flower Garden), nor the Conservatories at any time without a permit. No permits are given for use after 12 o'clock noon on Sundays and holidays.

3. Artists, and the public in general, may not bring into the Botanic Garden chairs, stools, or anything to sit in or on.

4. Holders of permits must not set up tripod cameras nor easels in such a way as to involve injury to living plants or lawns, nor to cause an obstruction to traffic on congested paths or walks.

5. Application for permits should be made at the office of the Director, Laboratory Building, Room 301, or by mail (1000 Washington Avenue), or by telephone (PRospect 9–6173).

GENERAL INFORMATION CONCERNING THE ACTIVITIES OF THE BROOKLYN BOTANIC GARDEN

The Brooklyn Botanic Garden, established in 1910, is a department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, special contributions, and tuitions. Its articulation with the City is through the Department of Parks.

By an Agreement with the City of New York, the functions of the Garden have been defined as two-fold: first, the advancement of botanical science through original research; and second, the dissemination of a knowledge of plants.

The first of these activities is carried on by director, curators, resident investigators, fellows, and others, who devote all or a part of their time to independent investigation. At present these investigations include studies in genetics, plant pathology, systematic botany, anatomy, physiology, economic botany, and horticulture.

The second function of the Garden, namely, the dissemination of botanical knowledge, is accomplished in the following ways:

I. By the teaching of classes—
   - (*a*) of adults who are interested in some phase of pure or applied botany, or of horticulture;
   - (*b*) of teachers of botany, biology, and nature study, who come for special courses on the subject matter or teaching methods of their subjects;
   - (*c*) of children who come voluntarily outside of school hours for lessons in nature study and gardening;
   - (*d*) of children who come with their teachers from public and private schools for special lessons on plant life and closely related subjects.

II. By lectures at schools, garden clubs, and elsewhere by staff members.

III. By broadcasting.

IV. By loan sets of lantern slides accompanied by lecture text, for use in the schools.

V. By the distribution to schools of study material for classes in botany, biology, and nature study.

VI. By public lectures and educational motion pictures at the Botanic Garden.

VII. By maintaining labelled collections of living plants, arranged systematically, ecologically, and otherwise on the grounds and in the Conservatories of the Garden.

VIII. By the herbarium, containing specimens of preserved plants from all parts of the world.

IX. By maintaining a reference library on plant life and related subjects, open free to the public daily (except Sundays and holidays).

X. By the following periodicals and publications issued by the Botanic Garden:

1. Ecology (Quarterly).
2. Genetics (Bimonthly).
3. Brooklyn Botanic Garden RECORD, including Annual Report and Guides (Quarterly).
4. Leaflets (Irregularly in Spring and Fall).
5. Contributions (Irregular).
6. Memoirs (Irregular).
7. Miscellaneous:

Syllabi of lectures.
Guide sheets for classes.
Announcement cards and circulars.
Bibliographies.
Miscellaneous books and booklets.

XI. By popular and technical articles in journals and the public press, including regular "News Releases" concerning Botanic Garden activities and events.

XII. By the maintenance of a Bureau of Public Information on all phases of plant life.

XIII. By providing docents to accompany members and others who wish to view the collections under guidance.

XIV. By the installation of botanical and horticultural exhibits at the Garden, the International Flower Show, and elsewhere.

XV. By cooperating with New York City Departments (e.g., Board of Education, Board of Higher Education, Department of Parks, Board of Health, and the Municipal Broadcasting Station—WNYC) and other agencies, in the dissemination of botanical knowledge.

The Brooklyn Botanic Garden is also taking an active part in the nation-wide movement for Scenic Preservation and legislation for the conservation of our native American plants.

A brief summary and report of the public educational work of the Garden from 1910 to 1928, with some attempt to set forth the fundamental principles upon which it is based, was published in the Brooklyn Botanic Garden RECORD for July, 1929. This is now out of print, but may be found on file at most of the larger libraries of the country.

CONTENTS

	Page
I. Cooperation with Local Schools	229
II. Bureau of Public Information	233
III. Docentry	234
IV. Meetings of Outside Organizations	234
V. Courses of Instruction	234
A. Courses for Members and the General Public	236
B. Courses for Teachers: Given in Cooperation with the Brooklyn Teachers Association	240
C. Children's Courses	243
D. Course for Student Nurses	244
E. Investigation	244
VI. Miscellaneous	245
VII. Other Educational Features	248

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXV OCTOBER, 1936 NO. 4

PROSPECTUS: 1936–1937

I. COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York in all matters pertaining to the study of plants and closely related subjects. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration methods, study material, etc., which otherwise would not be available.

Geography classes, as well as classes in nature study and botany, find the collection of useful plants in the economic plant house, the Local Flora Section, the Japanese Garden, and also the Meridian Panel, the Armillary Sphere, and the Labeled Boulders, valuable adjuncts to their class work. Arrangements may be made by teachers of geography to have their classes study these collections under guidance. Illustrated lectures for geography classes may also be arranged for at the Garden.

To visiting college classes in geology and physiography the Botanic Garden offers interesting material for a study of glaciation. Notable features are a portion of the Harbor Hill terminal moraine (Boulder Hill), the morainal pond (the "Lake"), the labelled glacial boulders, and the Flatbush outwash plain. See Guide No. 7, "*The Story of our Boulders: Glacial Geology of the Brooklyn Botanic Garden.*" See also pages 255–257 for statements concerning the Labeled Glacial Boulders, the Meridian Panel, and the Armillary Sphere.

A. Talks at Elementary Schools.—The principals of public or private elementary schools may arrange to have talks given at

the schools on various topics related to plant life, such as school gardens and garden work with children, tree planting, the conservation of wild flowers, Arbor Day, etc. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the *Curator of Elementary Instruction* for a list of talks and for appointments.

B. Talks at Secondary Schools and Colleges.—Informal illustrated talks on various subjects of an advanced botanical nature have been given for many years at Secondary Schools and Colleges by members of the staff. Arrangements for such talks should be made with the *Curator of Public Instruction.*

C. School Classes at the Garden.—(*a*) Public or private schools may arrange for classes, accompanied by their teachers, to come to the Botanic Garden for illustrated lectures either by the teacher or by a member of the Garden Staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. Blank forms are provided by the Garden for this purpose. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Fall and spring announcements of topics will be issued during 1936–37.

(*c*) The Garden equipment, including plant material, lecture rooms, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance so that such work will not conflict with other classes and lectures. For High School and College classes address the *Curator of Public Instruction.* For Junior High and Elementary School classes address the *Curator of Elementary Instruction.*

(*d*) The principal of any elementary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given to a class during the fall or spring. A small fee is charged to cover the cost of the materials used. The plants raised become the property of the pupils. The lessons will be worked out for the most part in the greenhouse, and the class must be accompanied by its teacher. This is adapted for pupils above the third grade.

D. Seeds for School and Home Planting.—Penny packets of seeds are put up by the Botanic Garden for children's use. In the

early spring, lists of these seeds, order blanks for teachers and pupils, and other information may be secured on application to the *Curator of Elementary Instruction.*

E. Conferences.—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature study. Appointments must be made in advance. Address the *Curator of Elementary Instruction.*

F. Study and Loan Material.—To the extent of its facilities, the Botanic Garden will provide, on request, various plants and plant parts for study; also certain protozoa and sterilized nutrient agar. When containers are necessary, as in the case of agar, algae, and protozoa, they must be furnished by the school.

In the past, the Garden has offered this service gratis, but both on account of the increasing demand and because of the decrease in appropriations, it has become necessary to make a small charge for the material supplied or loaned. This charge will be made only for material furnished to junior high schools, high schools, and colleges. As far as possible, material will continue to be supplied gratis to elementary schools in case one or more of their teachers are members of regular Botanic Garden classes. A Price List of the various materials furnished will be mailed on request.

Requests for high school and college material should be made by mail or telephone (PRospect 9–6173), **at least one day in advance,** to the School Service Assistant. Requests for elementary school material should be made to Miss Elsie T. Hammond, and should be called for at the Information Booth on the ground floor. High school and college material should be called for at Room 327.

Material Usually Available

1. Algae:
   - Pleurococcus
   - Spirogyra
   - Vaucheria
   - Desmids
   - Blue-green algae: Oscillatoria and others.
2. Fungi:
   - Forms of fungi and lichens.
   - Plus and minus strains of bread mold.

Smut of oats or wheat.
Black stem rust of wheat.

3. Liverworts: Conocephalum and Lunularia.
4. Moss plants: protonema "felt," and capsules.
5. Ferns:
   Prothallia: for these a covered Petri dish or tin box should be sent.
   Fronds with spores.
6. Selaginella with sporophylls.
7. Elodea—to show movement of protoplasm.
8. Corn or sorghum stems, dried.
9. Twigs to show opposite or alternate arrangement of buds.
10. Simple and compound leaves.
11. Various seeds and fruits to illustrate methods of dispersal.
12. Material for the study of genetics:
    Pods of Jimson weed showing inheritance of both smooth and spiny pods.
    Sorghum seeds for demonstrating inheritance of red seedling color.
    Pea seeds to show Mendelian seed and seedling characters.
13. Sensitive plants (*Mimosa pudica*).
14. Protozoa: Paramoecium, Euglena, and others.
15. Fruit flies (*Drosophila*), wild type and mutants, transferred to bottles of culture medium supplied by applicant.

Specimens Loaned for Exhibit

16. Leguminous roots with tubercles.
17. Riker mounts of powdery mildew, rusts and smuts, maple tar spot.
18. Riker mounts of peas showing inheritance of seed characters.
19. Oats showing inheritance of hull color.
20. Corn showing inheritance of endosperm colors.
21. Sorghum varieties and the F_1 hybrid.
22. Types of cereals: wheat, oats, barley, rye, rice, corn.
23. Eight types of wheat.
24. Eight types of barley.
25. Riker mounts of types of modified leaves.
26. Geranium, Coleus, Tradescantia—variegated green and white, for photosynthesis experiment.

Sterilized Agar

27. Petri dishes sent in *clean and dry* ten days in advance, or test tubes or flasks sent in one week in advance, will be filled with sterilized nutrient agar for the study of bacteria and molds.

G. Demonstration Experiments.—Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden for the benefit of their classes. Communications in regard to these matters should be addressed to the *Curator of Public Instruction.*

H. Loan Sets of Lantern Slides.—Sets of lantern slides have been prepared for loan to the schools. Each set is accompanied by a short lecture text of explanatory nature. In all cases these sets must be called for by a responsible school messenger and returned promptly in good condition. Address, by mail or telephone, Mr. Frank Stoll. The subjects now available are as follows. Other sets are in preparation.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Fall Wild Flowers
5. Forestry
6. Conservation of Native Plants

II. BUREAU OF PUBLIC INFORMATION

Consultation and advice, and the facilities of the library and herbarium are freely at the service of members * of the Botanic Garden and (to a limited extent) of others with special problems relating to plants or plant products, especially in the following subjects:

1. Plant diseases and determination (naming) of fungi.
2. Plant geography and ecology.
3. Determination of flowering plants.
4. The growing of cultivated plants and their arrangement; also their adaptation to soils, climate, and other factors.
5. The care of trees, shrubs, and lawns, and general gardening problems.

Inquiries should be directed to the *Curator of Public Instruction,* preferably by letter.

* For information about membership consult pages v–vii of this PROSPECTUS.

Determination of Specimens.—If the identification of plants is desired, the material submitted should include flowers, and fruit when obtainable. Identification of a single leaf is often impossible. For identification of plant diseases, representative portions of the part diseased should be sent.

III. DOCENTRY

To assist members and others in studying the collections, the services of a docent may be obtained. Arrangements should be made by application to the *Curator of Public Instruction* one week in advance. No parties of less than six adults will be conducted. This service is free of charge to members; to others there is a charge of 50 cents per person. For information concerning membership in the Botanic Garden see pages v–vii of this PROSPECTUS.

IV. MEETINGS OF OUTSIDE ORGANIZATIONS

The Brooklyn Botanic Garden is glad to welcome outside organizations wishing to hold meetings at the Garden, provided that the general purpose of the organization is closely allied to that of the Botanic Garden (e.g., Botanical Groups, Garden Clubs, Nature Study Clubs, Conservation organizations, etc.), or that the specific purpose of the meeting is of mutual interest and advantage to the organization and the Botanic Garden. Meetings must always be arranged for in advance. A folder giving full details, and an application blank may be had by addressing *The Custodian*.

V. COURSES OF INSTRUCTION

Except courses A20 and A23, each of the courses here announced is a unit and not a series of unrelated lectures. Students must enroll for an *entire course*. With the exceptions noted, no registrations will be made for separate class exercises.

Courses of instruction are offered in Botany, Horticulture, and Nature Study, and are divided into five classes:

A. For members and the general public (" A " courses, p. 236)
B. For teachers (" B " courses, p. 240)
C. For children (" C " courses, p. 243)

D. Other courses of a special nature ("D" courses, p. 244)
E. Research courses ("E" courses, p. 244)

Any course may be withdrawn when less than ten persons apply for registration. Since registration in many of the courses is restricted to a fixed number on account of the limited space available in the greenhouses, and for other reasons, those desiring to attend are urged to send in their application for enrollment and the entrance fee to the Secretary, Brooklyn Botanic Garden, several days in advance of the first exercise. This avoids delay at the beginning of the first exercise, ensures a place in the course, and enables the instructor to provide adequate material for the class.

Field Excursions.—When courses of instruction involve field excursions, these excursions are open only to those who have enrolled for the entire course.

Enrollment.—Persons are requested not to register in any course unless they are reasonably confident that they can attend the sessions of the class regularly and throughout. This is especially important where the number to be enrolled is limited. To register and not attend may deprive someone else of the privilege of attending.

Equipment available for the courses:

1. Three *Classrooms* (in addition to the Boys' and Girls' Club Room in the Laboratory Building), equipped with stereoscopes and views, stereopticons, plant collections, economic exhibits, charts, models, and other apparatus and materials for instruction.

2. Two *Laboratory Rooms,* with the usual equipment for plant study.

3. Three *Instructional Greenhouses,* for the use of juvenile as well as adult classes, for instruction in plant propagation and related subjects.

4. The *Children's Garden,* about three-quarters of an acre in area, in the southeast part of the Botanic Garden, divided into about 150 plots which are used throughout the season for practical individual instruction in gardening.

5. *The Children's Building,* near the north end of this plot, containing rooms for conferences and for the storage of tools, seeds, notebooks, special collections, etc.

6. *The Auditorium*, on the ground floor, capable of seating 570 persons, and equipped with a motion-picture machine and stereopticon, and electric current, gas, and running water for experiments connected with lectures..

In addition to these accommodations, the dried plant specimens in the herbarium, the living plants in the conservatories and plantations, and the various types of gardens, are readily accessible; while the main library and children's library, which contain a comprehensive collection of books on every phase of gardening and plant life, may be consulted freely at any time. See also pages 248–257.

A. Courses for Members and the General Public

Although the following courses are designed especially for Members of the Botanic Garden, they are open (unless otherwise specified) to any one who has a general interest in plants. Teachers are welcome. Starred courses (*) are open also for credit to students of Long Island University, and are described in the current Long Island University catalog. In harmony with an agreement entered into in the spring of 1935, the Botanic Garden, upon recommendation of the Chairman of the Biology Department of Long Island University, offers a course scholarship to one student of the University.

Unless otherwise specified, all "A" courses are *free to members,*† but the individual class exercises are open only to those who register for the entire course. Of others a fee is required, as indicated. In courses where plants are raised, these become the property of the class members.

A1. Plants in the Home: How to Grow Them.—Five talks with demonstrations. This course deals with the principles to be followed in raising plants. Practice in potting, mixing soils, making cuttings, etc. The members of the class have the privilege of keeping the plants they have raised. *On account of restricted space in the greenhouse, this class must be limited to 40. Registration according to the order of application. Fee to non-members, $6 (including laboratory fee); to members, $1 laboratory fee. Wednesdays, 11 a.m., November 4 to December 9. (Omitting November 11.)* Mr. Free.

† For information concerning membership in the Brooklyn Botanic Garden consult pages v–vii.

***A5. Trees and Shrubs of Greater New York: Fall Course.**—Ten outdoor lessons in the parks and woodlands of Greater New York on the characteristics of our common trees and shrubs, both native and cultivated, emphasizing their distinguishing features in the winter condition. *Fee, $5. Saturdays, 2:30 p.m., October 3 to December 12. (Omitting November 28.)* The first session will be held at the Brooklyn Botanic Garden.

Dr. Graves and Miss Vilkomerson.

***A9. Trees and Shrubs of Greater New York: Spring Course.**—Ten outdoor lessons in the parks and woodlands of Greater New York. Similar to the preceding, except that the different species are studied in their spring and summer conditions. *Fee, $5. Saturdays, 2:30 p.m., April 17 to June 19.*

Dr. Graves and Miss Vilkomerson.

A10. Evergreens.—Four outdoor lessons on the higher plants that have evergreen leaves, including both gymnosperms and angiosperms.

1. Species of pine and spruce
2. Yew, fir, hemlock, and others
3. The cypress family
4. Broad-leaved evergreens

Fee, $2. Wednesdays, 4–5:15 p.m., October 7 to October 28.

Dr. Gundersen.

A11. Flowering Plants and Ferns of the New York Region: Spring Course.—Seven sessions, in the Brooklyn Botanic Garden and in the woodlands near the City, for field identification of flowers and ferns of spring and early summer. *Fee, $3.50 Saturdays, 9:30 a.m., April 24 to June 19. (Omitting May 15 and 29.)*

Miss Rusk

A13. Flowering Plants and Ferns of the New York Region: Fall Course.—Four sessions. Field identification of the common plants of woods and roadsides, including identification of seeds and fruits. *Fee, $2. Saturdays, 9:30 a.m., September 19 to October 24. (Omitting September 26 and October 10.)*

Miss Rusk.

A14. Flower Arrangement.—A course of five lectures and demonstrations for those interested in flower arrangements for the

home. The selection and use of plant material, containers best suited for home use, and flower holders and supports will be demonstrated. Topics are as follows: Japanese Flower Arrangement and its application to Western use. Flower containers and their suitable use. The care of cut flowers. Flowers for color in home decoration demonstrated. Period arrangements in modern rooms. Table arrangements for formal and informal occasions. Variation in color effects with flowers, china, and linen. Criticism of original arrangements made by members of the class, with discussion of basis on which they are judged. For teachers and others. Fee to non-members $4.00, to members $2.00. Flowers will be supplied for class use. *Thursdays at 4:00 p.m., October 1 to 29 inclusive.*

Mrs. Whitney Merrill.

A20. Special Horticultural Groups.—This course consists of six lessons extending over three weeks in May and June. It presupposes a knowledge of the elements of gardening equivalent to that contained in courses A1 and A25. It consists of lectures illustrated by lantern slides and living material, and includes tours in the Botanic Garden to see the various plant groups under discussion. The subjects taken up are as follows:

Rock Garden plants	May 18	Flowering shrubs	May 28
Lilacs	May 21	Roses	June 11
Iris, bearded	May 25	Iris, Japanese	June 15

A limited number of bearded iris plants will be available for distribution to those taking the course. *Fee, $5. Tuesdays and Fridays in May and June, 10 a.m. to 12 noon.* This course is offered as a unit: no registration for single exercises.

Dr. Reed, Mr. Free, Dr. Gundersen, Mr. Doney.

A23. Flower Arrangement.—Sponsored by the Woman's Auxiliary. Four sessions. Flower Arrangement as a decorative art in typical American interiors. The principles of design and color demonstrated against effective backgrounds. Japanese floral art for American use discussed and demonstrated by Mrs. Yoneo Arai and Mrs. Ernest Frederick Eidlitz. Other guest speakers, Mrs. Roy M. Lincoln and Mrs. Henry J. Davenport. *Free to members. To non-members, $5. Single lectures, $1.25. Wednesdays at 11:00 a.m., January 13 to February 3.* For further information address Mrs. Whitney Merrill.

A25. Fundamentals of Gardening.—A course in first principles, for those who desire to carry on practical work in their own gardens and to start seedlings in the greenhouse. The lessons are as follows:

Making cuttings of plants for use in the outdoor garden.
Planting seed in the greenhouse.
Pricking out seedlings in the greenhouse.
The garden soil.
Outdoor lesson.

Class limited to 60 members. Fee to non-members, $7 (including laboratory fee); to members, $2 laboratory fee. Wednesdays, 10:30 a.m., March 24 to April 28. Miss Shaw and Miss Dorward.

*A30. **Ornamental Shrubs: Spring Course.**—Ten outdoor sessions held on the grounds of the Brooklyn Botanic Garden, dealing with the shrubs used in ornamental planting. More than two hundred species and varieties of shrubs are studied at the time of flowering. *Fee, $5. Wednesdays, 4 p.m., April 14 to June 16.* Mr. Doney.

*A31. **Ornamental Shrubs: Fall Course.**—Ten sessions, about eight of which are held outdoors in the Brooklyn Botanic Garden, for the purpose of becoming acquainted with the common species and varieties of cultivated shrubs. Fall flowers and fruits of ornamental shrubs and small trees, also evergreen shrubs, are studied. This is a continuation of the spring course. *Fee, $5. Wednesdays, 4 p.m., September 16 to November 18.* Mr. Doney.

A32. The Structure and Evolution of Flowers.—Ten outdoor sessions in the Brooklyn Botanic Garden. This course treats of the structure and possible lines of evolution of flowers, and the characteristics of important families of flowering plants. *Fee, $5. Thursdays, 4–5:15 p.m., April 15 to June 17.*
Dr. Gundersen.

A37. Lilacs.—Four outdoor lessons on the grounds of the Garden. The Brooklyn Botanic Garden's unusually comprehensive collection affords an opportunity for the study of about fifteen species and more than one hundred varieties of lilacs as they come into flower. *Fee, $2.* Three *Wednesdays* and one *Monday, 10:30–11:45 a.m., May 5, 12, 17, 19.* Dr. Gundersen.

A38. Plant-Animal Interdependence in Evolution.—Three lectures on the divergent but interrelated development of the two great lines of life; with illustrations by Miss Maud H. Purdy.

1. Water plants and water animals
2. Land plants and cold-blooded animals
3. Flowering plants and warm-blooded animals

Fee, $1. Thursdays at 4:00 p.m., November 5 to November 19.
Dr. Gundersen.

B. Courses for Teachers: Given in Cooperation with the Brooklyn Teachers Association

These courses have been accepted by the Brooklyn Teachers Association, and appear in its Syllabus of Courses. On satisfactory completion of each course, the student is awarded a certificate by the Brooklyn Teachers Association, in cooperation with the Brooklyn Botanic Garden. The courses are also accepted by the New York Board of Education for credit toward higher teaching licenses, one credit being granted for each 15 hours (with the exception of "B8, Plant Culture"). Through an agreement with Long Island University, undergraduate credit for certain courses will be allowed toward fulfilling the requirements for a university degree, provided the admission requirements at the University and the laboratory requirements have been fulfilled. Such courses are starred (*). By special arrangement with the institution concerned, these credits have also been used as undergraduate credits in other colleges and universities. Nature materials used in the courses, and plants raised become the property of the student.

Members of the Garden are entitled to a 50 per cent. discount from the regular fee for all "B" courses; from other persons the indicated fee is required. Long Island University students desirous of electing any of these or of the "A" courses should notify Dean Tristram W. Metcalfe or Dr. Ralph H. Cheney, who will give the candidate a card entitling him to admission to the course. The student should present this card at the beginning of the first session of the course.

B1. General Botany.—A two-year course of thirty class meetings and thirty two-hour laboratory periods each year. The

first year (A) is spent on the structure and functions of the higher plants. The second year (B) deals with the structure, life histories, and relationships of the lower groups: bacteria, algae, fungi, lichens, mosses, and ferns. Four credits each year. In 1936–37 the first half (A) will be given. *Fee, $10 each year. Thursdays, 4–6 p.m., beginning September 24*, and one other hour a week to be arranged. Miss Rusk.

B2 (a). Fall Nature Study.—A thirty-hour course in fifteen two-hour sessions, including field work. This course is based on the New York City Syllabus on Nature Study for the elementary grades, and is planned to acquaint the student with botanical nature material, and to be of specific help in setting up nature rooms and planning lessons. Two credits. *Fee, $10. Tuesdays, 4–6 p.m., beginning September 29.* Miss Hammond.

B2 (b). Spring Nature Study.—A spring course similar to B2 (a). Miss Farida Wiley, of the American Museum of Natural History, will conduct a field lesson on bird study on a date to be announced. Two credits. *Fee, $10. Tuesdays, 4–6 p.m., beginning February 16.* Miss Hammond.

B3. Elements of Horticulture.—Thirty sessions. For teachers only. Lessons in potting and general care of house plants; methods of plant propagation, including the planting of bulbs; making cuttings (soft wood, and leaf); sowing seeds; preparing for the outdoor garden. Most of this work is carried on in the greenhouses. Emphasis will be laid on problems of a practical nature. Mr. L. Gordon Utter will give two lectures, with demonstrations and practical work in methods and results of plant breeding. Two credits. *Fee, $10. Wednesdays, 4 p.m., beginning September 30.* Miss Shaw and Assistants.

B5. Junior Garden Practice.—A thirty-hour course in fifteen two-hour sessions. The course covers the theory and practical work in Junior Gardening and is especially planned to assist those teachers who have charge of children's gardens. Two credits. *Fee, $5. Thursdays, 4–6 p. m., October 1–29, covering ten hours; February 4–April 8, twenty hours.*

Miss Shaw and Miss Miner.

B7. Greenhouse Work.—Thirty sessions. For teachers only. A continuation of Elements of Horticulture and open to

students who have taken that course. Further study of plant propagation methods: arrangement of plants in hanging baskets, window boxes, dishes, etc.; special culture of certain house plants and winter-flowering greenhouse plants; methods of work obtained from Miss Dorward's recent study at the School of Horticulture, Swanley, England. Two credits. *Fee, $10. Tuesdays, 4 p.m., beginning October 6.* Miss Dorward.

B8. Plant Culture.—A course of twenty weeks duration for those who have completed Elements of Horticulture and Greenhouse Work. Work is entirely in the greenhouse. No Board of Education credits are given for this course. *Fee, $10. Thursdays, 4 p.m., beginning October 15.* Miss Shaw.

***B10. Flowering Plants: Field and Laboratory Study.**—Thirty sessions. The object of this course is to become acquainted with species of wild flowering plants (including weeds), and to learn how to identify them. Field and laboratory work are distributed according to the weather, the season, and the needs of the class. The field work is done in the Brooklyn Botanic Garden. The laboratory work consists of examining flowering plants and identifying them by means of a key, and of pressing, drying, and mounting plants for permanent specimens. Prerequisite: an elementary course in botany. Two credits. *Fee, $10. Wednesdays, 4–6 p.m., beginning September 23.* Miss Rusk.

***B13–14. Trees and Shrubs of Greater New York.**—Twenty two-hour sessions. A course of outdoor lessons in the parks and woodlands of Greater New York, the principal object being to gain a ready acquaintance with the common trees and shrubs of the eastern United States, which are well represented in this region. The species are considered in systematic order, in both winter and summer conditions, and the features pointed out by which they may most easily be recognized. Two credits. *Fee, $10. Saturdays, 2:30 p.m., October 3rd to December 12 (omitting November 28); and April 17 to June 19, 1937.*

Dr. Graves and Miss Vilkomerson.

B17. Genetics.—Thirty class meetings and fifteen two-hour laboratory periods. An introductory course in heredity and variation, including discussion of Mendelian principles, the physical basis of heredity, sex linkage, factor linkage, factor interaction, and quantitative inheritance. Laboratory work on plant material

and *Drosophila*. Prerequisite: an elementary course in botany. Three credits. *Fee, $10. Tuesdays, 4 p.m., beginning September 22; and Fridays, 4 p.m., beginning September 25.* Miss Rusk.

C. Children's Courses

Thirty separate courses are given Saturday mornings for boys and girls from eight to nineteen years old in the spring, fall, and winter.

The children are grouped according to age and experience. For example, under I (below), twelve separate courses are given; under II, four separate courses; under III, fourteen. Under IV, the Outdoor Garden, 200 children are working from late April to mid-September. This does not represent one course, but many courses combined under one heading, "The Outdoor Garden."

Miss Shaw and Assistants.

I. The Fall Course takes up nature study on the grounds; plant propagation in the greenhouses, using stem and leaf cuttings; bulbs and corms; making of terrariums and dish gardens. Enrollment limited to 175 children. *Fee, ten cents. Saturday mornings, 9–11:15, October 24 to December 19.*

II. Winter Course.—Children who have shown unusual ability are chosen from the fall group for winter work. Introduction to the observation of plants through the microscope; propagation projects; study of economic plants; plans for summer flower borders, involving a liberal use of the Children's Library; flower games, etc. Group limited to 50. *No fee. Saturday mornings, 9–11:15, February 6 to March 6.*

III. Spring Course.—Nature study and preparation for the outdoor garden, including studies of seed germination, seed sowing in the greenhouse, and the making of garden plans. All candidates for the outdoor garden must be in spring classes. Enrollment limited to 200. *Fee, ten cents. Saturday mornings, 9–11:15, March 13 to April 17.*

IV. Outdoor Garden Course.—The outdoor garden is open throughout the summer season, and hours arranged to fit in with children's vacation schedules. No child is assigned an outdoor garden who has not had the spring preparatory work. Group limited to 200 children. *Fee, twenty-five or thirty-five cents depend-*

ing on the size of the garden. The garden session begins *April 24.* The head garden teacher is Miss Miner.

D. Course for Student Nurses

D1. General Botany With Special Reference to Medicinal Plants.—A course of 10 spring and 10 fall lectures, demonstrations, and field trips for student nurses. Arranged in cooperation with various hospitals. The general principles governing the life of plants, as well as the use and care of flowers and potted plants in the sick room, will be considered. Special attention will be paid to the identification of officinal plants in the field. Hours to be arranged. *No fee.* Dr. Graves.

E. Investigation

1. *Graduate Work for University Credit*

By the terms of a cooperative agreement between New York University and the Brooklyn Botanic Garden, properly qualified graduate students may arrange to carry on independent investigations in botany at the Garden under the direction of members of the Garden Staff, who are also officers of instruction in the Graduate School of the University. The advantages of the library, laboratories, herbarium, and collections of living plants at the Garden are freely at the disposal of students registered at New York University for such work. Such properly enrolled graduate students are charged no additional fees by the Garden. The following courses are approved by the faculty of the Graduate School of New York University and are given credit as full courses:

E6. Research in Mycology and Plant Pathology.—Investigation of problems relating to fungi and fungous diseases of plants. Dr. Reed.

E8. Research in Forest Pathology.—Investigation of the diseases of woody plants. Dr. Graves.

E9. Research in the Structure of Flowers. Dr. Gundersen.

E10. Research in the Systematic Botany of the Flowering Plants. Dr. Svenson.

2. *Independent Investigation*

The facilities of the laboratories, conservatories, library, and herbarium are available to qualified investigators who wish to carry on independent researches in their chosen field. There is a charge of $25 per year, payable to the Botanic Garden.

VI

MISCELLANEOUS

Press Releases

In order to keep the public informed of floral displays and other events at the Garden, news items are sent at fairly regular and frequent intervals to the metropolitan dailies and to many of the suburban papers.

Broadcasting

Broadcasitng over WJZ, WOR, and WNYC, including co-operation with the State of New Jersey Radio Garden Club, is being continued during 1936 and 1937. Those interested should watch the daily paper announcements for talks on gardening and plant life. A schedule of radio talks will be sent on request.

Circulars of Information

Circulars descriptive of the various courses and lectures are distributed, without charge, to a regular mailing list which includes Brooklyn Botanic Garden officials and members, members of the Woman's Auxiliary, all the libraries and schools of Greater New York, registered and former students, and others. Requests to be placed on this mailing list should be addressed to the *Curator of Public Instruction*.

Popular Publications

Leaflets.—The publication of the Brooklyn Botanic Garden *Leaflets* commenced in 1913. The current series is Series XXIV. At the end of every few years, for convenience in binding, a table of contents of the *Leaflets* published during that period is issued.

The purpose of the *Leaflets* is primarily to present popular information about plant life in general for teachers and others, and to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. The *Leaflets* are free to members of the Garden and (on request) to teachers in the schools of Greater New York. For others, the subscription is 50 cents per year, or 5 cents a number (4 pages).

The Plant World.—By C. Stuart Gager. A popular introduction to the more interesting facts concerning the plant life of the earth, and the importance of plants in our daily lives. 136 pages; 79 illustrations. Price 75 cents. On sale at the Information Desk and Entrance Gates, and by mail.

A Teaching Guide to the Trees and Shrubs of Greater New York.—By Arthur H. Graves and Hester M. Rusk. A handbook used in Botanic Garden classes, of brief, non-technical descriptions of the woody plants of the Greater New York region, with the characters by which they may be recognized in summer or winter. Keys, a glossary, and index are appended. ix + 76 pages. Price 75 cents. On sale at the Information Desk and Entrance Gates, and by mail.

Illustrations of Flowering Plants of the Middle Atlantic and New England States.—By the late George T. Stevens, M.D. Edited by Alfred Gundersen. Contains 199 plates and index of about 1500 species of the commoner flowering plants, exclusive of the grasses and sedges. Reprinted primarily for use in Brooklyn Botanic Garden classes. Price $1.00. On sale at the Information Desk and Entrance Gates, and by mail.

Flower Game Booklet.—By Members of the Boys and Girls Club and Elsie T. Hammond. Consists of a number of flower games for children to be played both indoors and out. Its object is to acquaint children in an interesting and delightful way with plant material. Price, 15 cents. On sale at the Information Desk and Entrance Gates, and by mail.

Guide Books, Maps and Souvenir Postcards of the Garden

During the last few years, Guide Books have been published from time to time, as special numbers of the *Brooklyn Botanic Garden Record*, based upon and explaining various Botanic Garden features and exhibits.

Each of these publications is more than a guide to an exhibit; it is an elementary treatise on the general subject illustrated by the Garden feature or exhibit. In this way the Guides have value even for those who may not be able to visit the Botanic Garden. The following numbers have been published:

Guide No. 2. Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. By C. Stuart Gager. May, 1929. 36 pages, 16 illustrations and map. Price, 25 cents. Out of print.

Guide No. 3. The story of our metate: A chronicle of corn. By F. W. Hodge. November, 1929. 25 pages, 14 illustrations. Price, 25 cents.

Guide No. 4. The Japanese Garden of the Brooklyn Botanic Garden. By Bunkio Matsuki. July, 1930. 38 pages, 20 illustrations. Price, 35 cents; by mail, 40 cents. Out of print.

Guide No. 5. The Rock Garden of the Brooklyn Botanic Garden. By Montague Free. May, 1931. 55 pages, 28 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). By Bunkio Matsuki. November, 1931. 16 pages, 11 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. By C. Stuart Gager and Ernst Antevs. May, 1932. 43 pages, 22 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 8. The story of fossil plants. Guide to the eight transparencies in Conservatory House No. 2. By Edward W. Berry. July, 1932. 29 pages, 8 illustrations. Price, 35 cents; by mail, 40 cents.

One copy of each Guide is mailed free, as published, to members of the Garden. Additional copies at regular rates. Similar guides are in preparation and will be published from time to time.

Books and manuscripts illustrating the history of botany: An annotated list. By Emilie Perpall Chichester and C. Stuart Gager. July, 1935. 36 pages. Price, 40 cents. Based upon incunabula and other items in the Library of the Brooklyn Botanic Garden.

A detailed map of the Garden, showing not only the various types of gardens included in the Botanic Garden area, but especially the location of the various orders and families in the Sys-

tematic Section, is appended to the General Guide (Guide No. 2). Copies are on sale at 5 cents each.

A colored picture map of the Garden, 7½ x 3½ feet, designed and executed by Miss Helen Sewall, is on view in the Laboratory Building. This map was presented to the Garden at the Annual Spring Inspection, May 14, 1929, by members of the Woman's Auxiliary and other friends, as a memorial to Dr. Glentworth Reeve Butler (1855–1926), and in grateful recognition of the services of Mrs. Butler, chairman of the Woman's Auxiliary, 1926–1932. Photographs of this map (in black and white, 6½ x4¼ inches) may be had at 20 cents each.

Souvenir postcards, in colors, may be had at 10 cents a set (7 cards); three for 5 cents; 2 cents each. The subjects are: Scene in the Children's Garden; The Brook; Daffodils in the Lawn; The Lake; Children's Building and Formal Garden; The Rock Garden (Waterfall and Iris); The Japanese Garden (Wisteria); Inflorescence of Sago Palm (*Cycas revoluta*).

Orders for guide books, maps, and souvenir postcards, accompanied by remittance, should be sent to *The Secretary*. These articles may also be obtained at the Information Desk in the Laboratory Building, and at the Entrance Gates.

VII

OTHER EDUCATIONAL FEATURES

Plantations

The plantations comprise the following sections and gardens:

1. General Systematic Section (trees, shrubs, and herbaceous plants arranged according to orders and families).
2. Local Flora Section (Native Wild Flower Garden). Arrangement ecological.
3. Ecologic Garden. (Temporarily discontinued.)
4. Japanese Garden.
5. Rock Garden.
6. Rose Garden.
7. Iris Garden.
8. Water Gardens (Lake, Brook, Swamp, Bog, Pools).

9. Children's Garden.
10. Shakespeare Garden.
11. Horticultural Section, including a Wall Garden.
12. Conservatory Plaza (Water Lilies, Herbaceous Borders).
13. Laboratory Plaza (Magnolias).
14. Various horticultural collections, as for example:
    Flowering cherries, plums, apples, etc.
    Lilacs.
    Peonies.
    Azaleas and Rhododendrons.
    Iris (Bearded and Japanese).
    Cannas.
    Dahlias.
    Hardy Asters.
    Hardy Chrysanthemums.
15. Miscellaneous plantations.
    a. Naturalistic plantings of bulbs.
        Crocus, Daffodils, Poets Narcissus, etc.
    b. Decorative and screen plantings.
16. Experimental Garden (Test Garden for Beardless Iris; Plant Pathology and Plant Breeding Plots).
17. Nursery.

As noted under Docentry (p. 234), arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a.m. until dusk; on Sundays and holidays from 10 a.m. until dusk.

Automobiles.—Automobiles are not regularly admitted to the Garden. On application to the Director special permits for automobiles are issued, *to members only*, to enable those who may not be able to walk through the plantations to enjoy the Garden. Arrangements must be made in advance (preferably one day in advance). *In every case the car must be accompanied by a representative of the Garden.*

Systematic Section

The main part of the outdoor plantations is devoted to the Systematic Section, which extends from north to south through the

central part of the Garden. Here the plants are grouped according to their botanical relationships, in orders, families, and genera, following approximately the Engler system of plant classification. From the simpler and more primitive types of plants at the north end, to the more highly developed groups at the south, the Systematic Section comprises representative members of the families of plants which are hardy or semi-hardy in this climate. In accordance with this arrangement, the ferns and the conifers and other gymnosperms are at the northern end. Then follow the trees, shrubs, and herbaceous plants of the various families of dicotyledons. Along the east side of the Brook are the polypetalae. Along the west side of the Brook are the monocotyledons (north of the Rock Garden), and the sympetalae (south of the Rock Garden). The catkin-bearing trees and shrubs follow the line of the Brook. Wherever possible, the plants chosen to represent their groups are those which are of interest from both botanical and horticultural points of view.

Local Flora Section

This is an area of about two acres devoted to plants native within approximately 100 miles of Brooklyn (the Torrey Botanical Club range). The following ecological units are represented: bog, sand barren, pond, meadow, and woodland. Nearly all the native plants of general interest are well established here. Arrangements may be made with the *Curator of Public Instruction* for its inspection under guidance.

Japanese Garden

The Japanese Garden, first opened to the public in 1915, was made possible by a gift to the Botanic Garden of $12,500 from Mr. Alfred T. White, "the father of the Botanic Garden." The design, by the Japanese landscape architect, Mr. Takeo Shiota, carries out faithfully the Japanese idea of a *Niwa*, or landscape garden. Since January 1, 1919, this Garden has been in charge of Miss Mary Averill, honorary curator of Japanese gardening and floral art, and has been steadily improved, under her supervision, by Japanese gardeners. For details and explanations of the

meaning of the various features see " The Japanese Garden of the Brooklyn Botanic Garden ": Guide No. 4. (*Brooklyn Botanic Garden Record* **19**: 197–234. July, 1930.) Out of print, but available in libraries.

Rock Garden

The Rock Garden, constructed in the spring of 1916, is, in point of time, perhaps, the first rock garden of any considerable size in a public garden or park in the United States. The rocks used in its construction are glacial boulders which were uncovered in the course of grading operations on other parts of the grounds; they are the only " native " rocks on Long Island, with the exception of one small outcrop on the northwest shore. The general idea in making the garden was that of representing a boulder-strewn slope, but this design, of necessity, was modified in places to provide proper cultural conditions as to drainage, depth of soil, and shade. The garden is planted with about eight hundred species and varieties of alpine, saxatile, and other plants suitable for rock garden culture. Persons interested in rock gardening will find Guide No. 5, *The Rock Garden of the Brooklyn Botanic Garden,* helpful; also, *Leaflets,* Series XI, No. 6, *The Rock Garden.*

Conservatory Plaza and Waterlily Pools

The initial development of the Conservatory Plaza and Waterlily Pools, including the paved walks, eight stone seats, four herbaceous borders, south pool for hardy waterlilies, and north pool for sub-tropical and tropical forms, was due to a gift to the Botanic Garden of $19,260 in 1919 and 1920 from Mr. Alfred T. White. The south pool contains 26 hardy species, and the north pool (heated) 42 tender species. For the latter the Garden is indebted to the perennial generosity of William Tricker, Inc., Saddle River, New Jersey.

Rose Garden

The Rose Garden, occupying about one acre in the northwest part of the Botanic Garden, was formally opened to the public on Sunday afternoon, June 24, 1928. This garden was made pos-

sible by a gift of $15,000 from Mr. and Mrs. Walter V. Cranford, of Greenwich, Connecticut.

The general plan of the Garden is as follows: At the north end, entrance is gained through a Doric pergola. Three parallel rows of beds extend to the southward from the pergola, as far as the pavilion. In the central row of beds, varieties of hybrid perpetuals have been planted along with many of the small polyantha type; each of the two side rows contains varieties of hybrid teas. Varieties of pillar and post roses are planted at regular intervals, on suitable supports, in the beds, with standards between the beds of the side rows. The trellis surrounding the garden, and also the pergola and pavilion, furnish support for climbing roses, while the marginal beds along the trellis are for wild species and their derivatives. South of the pavilion, three additional beds are devoted to historical roses, *i.e.*, those mentioned in old literature, and to hybrid sweet briers.

The Rose Garden is open to the public from 9 a.m. to 5 p.m. on weekdays (except holidays) during the rose season, and from 10 a.m. to 7 p.m. in June. Children are admitted only when accompanied by responsible adults.

Flower Days

In order to afford members of the Garden and friends whom they may invite, an opportunity to see, under expert guidance, some of the most conspicuous and interesting floral displays of the Garden; to assist them toward solving some of their own gardening problems; and to enable them to meet for discussion, a series of special days, called Flower Days, was inaugurated in 1927. The dates selected are those in which the particular flowers furnishing the theme for discussion are in their prime. Up to and including 1935 the following "Days" have been observed:

Crocus Day
Daffodil Day
Tulip Day
Rock Garden Day
Japanese Garden Day
Iris Day
Rose Garden Day (June)
Japanese Iris Day
Water Garden Day
Fall Rose Garden Day
Canna Day
Chrysanthemum Day

On each of these occasions a specialist gives an illustrated talk on the flower of the Day, followed by a tour of inspection of the flowers in bloom on the grounds of the Garden. During the outdoor inspection there is free discussion of questions of desirable varieties, culture, plant diseases, etc. On returning to the Laboratory Building, tea is served. The exercises commence at 3:30 p.m.

Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography are the following useful plants from the tropics and subtropics: banana, orange, lemon, lime, kumquat, tamarind, West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used for making certain kinds of fiber hats), fig, grapevines from north and south Africa, date palm, coconut palm, chocolate tree, coffee, tea, ginger, bamboo, mahogany, balsa, cocaine plant, black pepper, annatto (used in coloring butter and cheese), cardamom, olive, pomegranate, logwood, durian, mango, sugar cane, avocado (so-called "alligator pear"), West Indian and other rubber plants, banyan, religious fig of India, and numerous others.

It may be of interest to teachers of botany that the nine extant genera of cycads are represented in House 12. To reach the Cycad House take the first door to the *left* after entering the central or Economic House and pass through to the end house.

The Conservatories are open April 1 to October 31, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to March 31, 10 a.m.–4 p.m. (Sundays, 2–4).

Herbarium

The Garden herbarium consists at present of about 200,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algae, and myxomycetes. This collection may be consulted daily (except Sundays and holidays) from 9 a.m. until 5 p.m., Saturdays from 9 a.m. to 12 m. Specimens submitted for identification will be gladly received. Address the *Curator of the Herbarium*.

Library

The rapidly growing library of the Garden comprises at present more than 18,600 volumes and about 15,000 pamphlets. This is not a circulating library, but is open free for consultation to all persons daily (except Sundays and holidays) from 9 a.m. until 5 p.m. (Saturdays, 9 to 12). Nearly 1,000 periodicals and serial publications devoted to botany and closely related subjects are regularly received. These include the transactions of scientific societies from all quarters of the globe; the bulletins, monographs, reports, and other publications of various departments of the United States Government, as well as those of foreign governments, and of all state agricultural experiment stations and agricultural colleges; the publications of research laboratories, universities, botanic gardens, and other scientific institutions of the world, as well as the files of independent journals devoted to the various phases of plant life. The library is specially rich in publications of foreign countries and has a growing collection of incunabula and other pre-Linnean works.

Bibliographical assistance is rendered to readers by members of the Library staff.

An annotated list of the incunabula, pre-Linnaean works, old herbals and other rare or historically important books in the Library was published as the July, 1935, number of the Botanic Garden RECORD. Copies are for sale at 40 cents each.

Laboratory Building

The Laboratory Building contains (besides offices of administration and the Library and Herbarium mentioned above) four laboratory rooms, a culture room, three classrooms with stereopticon and other equipment for instruction, a room for the installation of temporary exhibits, six private research rooms, and an auditorium seating about 570 and equipped with motion picture machine, stereopticon, and lecture table supplied with water, gas, and electric current for lectures involving experimental work.

Instructional Greenhouses

A range of three greenhouses, each about 20 x 30 feet, is provided for the practical instruction of children and adults in plant propagation and other subjects.

Children's Room

A gift of $1,500 in 1921 from Mrs. Helen Sherman Pratt, supplemented in 1923 by a further gift of $500 from Mr. George D. Pratt, has made it possible to provide a beautifully decorated room for the use of the Boys' and Girls' Club. The room contains a nature-study library, and is equipped with stereoscopic views, photographs, and preserved and living specimens of plant life, for the instruction and entertainment of boys and girls. The room is open free to all children. Contributions of specimens and of books on nature study and closely related subjects will be most welcome.

Children's Garden

A plot of about three-quarters of an acre in the southeast part of the Botanic Garden is devoted to the theoretical and practical instruction of children in gardening. The larger part of this area is laid out in garden plots which will accommodate about 200 children. At the south end is a Shakespeare Garden, given by Mrs. Henry W. Folger.

Children's Building

This is located in the northern part of the Children's Garden plot and contains a conference room, and rooms for the storage of garden tools and implements. The furniture in the conference room was a gift from Mrs. James H. Post. A garden library, a gift of friends, has been added. North of the Children's Building is a plot planted to ornamental shrubs and herbaceous perennials for the instruction of the children.

Non-Botanical Educational Features

Meridian Panel.—In 1931 there was placed in the paved walk in front of the main west entrance to the Laboratory Building a Terrestrial Position Panel, briefly referred to as the "Meridian Panel." This panel, of black Belgian marble terrazzo, is 21 feet, 2 inches long, and 5 feet wide. It contains a brass strip, 20 feet long and ⅞ inch wide, laid along the geographical meridian, the location of which was accurately determined by Mr. Weld Arnold, then of the School of Surveying of the American Geographical Society, but now of the School of Geography, Harvard University.

Another brass strip, 18½ feet long and ⅝ inch wide, marking the magnetic meridian, crosses the geographical meridian at an angle of 11° 11′. The data at the ends of the meridians are as follows:

At the North End:

Magnetic north. Variation 11° 11′ west in 1931
Annual increase 4′

At the South End:

Altitude above mean sea level, 115 feet
North latitude, 40° 40′ 06″
Longitude west of Greenwich, 73° 57′ 48″
To the North Pole, 3416.7 miles
To the Equator, 2798.2 miles

This feature is proving of much public interest, and the data are constantly being copied by school classes and others.

Armillary Sphere.—The central feature of the Laboratory Plaza is the large Compass and Armillary Sphere erected in 1933. This was made possible through a bequest of the late Alfred W. Jenkins, a former member of the Botanic Garden Governing Committee. The Armillary Sphere consists of circular bands of bronze representing the principal celestial circles, and has been designed to serve also as a sun dial. It is mounted on a pedestal of Carver black granite from Vinal Haven, Maine.

The pedestal rests on an octagonal platform of Stony Creek (Connecticut) pink granite, and the whole is mounted at the center of a large circular compass paved with marble terrazzo in four colors, each color representing a different point of the compass. The marble chips used in the terrazzo are of various origins, the red marble coming from Massa, Italy, the black from Mazy, Belgium, the green from Cardiff, Maryland, and the yellow from Siena, Italy. The armillary sphere (with pedestal) and the compass, as well as the entire Plaza, were designed by Mr. Harold A. Caparn, landscape architect of the Botanic Garden. The signs of the zodiac, in bas relief, were modeled by Miss Rhys Caparn.

Labeled Boulders.—The Brooklyn Botanic Garden is located near the western end of the terminal moraine of Long Island. This moraine was deposited at the southern edge of the continental glacier that occupied the northern part of North America, during

the last Ice Age. The southward-moving ice picked up and carried along innumerable boulders derived from rock ledges in various localities north of what is now Long Island. During their journey, these boulders were rounded and polished and, in some cases, marked with striations that still persist. Twenty-eight of these boulders have had their lithological composition carefully determined and compared with that of rock ledges to the north. By this study it has been possible to determine, with a fair degree of accuracy, the approximate places from which the boulders now in the Botanic Garden were derived. Bronze tablets, given by President Edward C. Blum, of the Board of Trustees, have been placed on these boulders, telling their composition and probable place of origin, and stating that they were brought to the Garden by the continental ice-sheet during the glacial period.

A similar bronze tablet is mounted on a boulder at the foot of Boulder Hill (which takes its name from the large glacial erratic on its summit). The inscription reads, "Boulder Hill and the entire northern portion of the Botanic Garden are part of the terminal glacial moraine extending from The Narrows to Montauk Point. This tablet was given in 1932 by the Boys' and Girls' Club of the Brooklyn Botanic Garden."

Guide No. 7, *The story of our boulders,* has been prepared for the use of classes in geography or geology, or others who may be interested. Copies may be obtained at the Information Desk and Entrance Gates at 35 cents each; by mail, 40 cents. Arrangements may be made in advance for docents to conduct classes who wish to study these labeled boulders.

INDEX TO VOLUME XXV

Accessions, Library, 123
Acer leucoderme, 107
Actinidia pergola, 35
Address delivered at the Twenty-fifth Anniversary exercises of the Brooklyn Botanic Garden, May 13, 1935, 185
Aesculus parviflora, 107
Aletris farinosa, 212
Allan, Mrs. Evelyn W., 42
Amelanchier stolonifera, 226
American Academy of Arts and Sciences, 63
  Index of Cultivated Trees and Shrubs, 102
  Iris Society, 59
  Journal of Botany, 17, 34, 165
    and the Brooklyn Botanic Garden, 167
    Report of the Business Manager for the Period January 1, 1914 to December 31, 1935, 169
Andropogon scoparius, 212
Anniversary Group at Brooklyn Botanic Garden, May 15, 1935, Twenty-fifth, Preceding p. 11
  Sponsoring Committee for the Twenty-fifth, 183
  Twenty-fifth, 12, 174
"Announcements", 185
Antevs, Ernst, 26
Anthophyllite boulder, 25
Arctostaphylos Uva-ursi, 213
Arenaria caroliniana, 110
Armillary sphere, 256
Asclepias syriaca, 222
Asplenium montanum, 106
Aster acuminatus, 107
Astor Expedition, 17
Attendance, Garden, 78
Automobiles, 249
Averill, Mary, 25

Bake-Apple berry, 219
Balk, Robert, 25
Baptisia tinctoria, 212
Beetle, Elm-bark, 19
Benedict, Ralph C., 132
Benefactors, 193
Benson, Philip A., 40
Bequest to the Brooklyn Botanic Garden, Forms of, Preceding p. 11
Berberis canadensis, 106
Best, Julia E., 81
Blaksley Botanic Garden, 122
Botanic Gardens
  Blaksley, 122
  Huntington, 122
  United States, 30
  University of California, 122
Botanical Society of America, 34
Boulders, Labeled, 256
Boykinia, 106
Boy Scout Work, 90
Brandwein, Paul F., 59
Broadcasting, 31, 245
Brooklyn Botanic Garden Publications, 1935, Report on, 165
  Institute of Arts and Sciences, 33
Butler, Mrs. Glentworth R., 96

Cabot, Mrs. Irving L., 40
Calopogon pulchellus, 110
Caparn, Harold A., 22, 35, 99
Carroll, Michalena, 97
Carya alba, 227
  glabra, 227
  ovata, 227
Castanea crenata × *C. dentata,* 65
  Henryi, 71
  Seguinii, 68, 71
Cedar, White or Swamp, 220, 225
Century, The First Quarter, 12
Chaenomeles Maulei, 26
Chamaecyparis thyoides, 225
  var. *crebra,* 220
Chelone Lyoni, 107
Cheney, Ralph H., 78, 133
Chestnut, Japanese-American, 65
  Breeding Work in 1935, 62
Chichester, Emilie P., 128
Children's Building, 255
  Courses, 243
  Garden, 255
  Room, 255
Ching, R. C., 71
Chinquapins, 73
Chiogenes hispidula, 110
Chronica Botanica, 34

City is Doing for the Garden, What the, 13
The Botanic Garden and the, Preceding p. 11
Clark, Beatrice, 41, 98
Classes at the Garden, School, 230
Docentry and Visiting, 90
Clematis ochroleuca, 218
Clethra acuminata, 106
Cloudberry, 219
Coffea arabica, 78
Coffee and Tobacco Pharmacology, 78
Collections Fund, 43
Committee for the Twenty-fifth Anniversary, Sponsoring, 183
Conferences, 231
Conklin, Marie E., 59
Conradina verticillata, 105
Conservatories, 117, 253
Conservatory Plaza, 251
Constructional Work, 24
Contributions, 17
and Memoirs, 167
Cooperation, 30, 88
with Governmental Relief Agencies, 34
with Local Schools, 229
Corema, 110
Courses, Adult, 83
Children's, 243
Cranford, Walter V., 40
Croomia, 107
Croton alabamensis, 106
Scouleri, 107
Cuba, Western, 17
Currie, James N., 59
CWA, 35
CWS, 35
Cypripedium hirsutum, 108

Delectus Seminum, Brooklyn 1935, 1
Deutzia Vilmorinae, 90
Dicotyledons, The Classification of, 75
Director, Report of the, 11
Docentry, 234
and Visiting Classes, 90
Dodecatheon Meadia, 108
Doney, Charles F., 102
Donors, 194
Dorward, Margaret M., 41, 98
Dutch elm disease, 116

Ecology, 17, 166
Education, Department of, 32
Elementary, 29
Public, 27
Elementary Instruction for 1935, Report of the Curator of, 91
Eleocharis, 76
Elm, Asiatic, 21
Chinese, 21
Disease, Dutch, 19
Red, 19
Emergency Relief Bureau: Works Division, 34, 37
Emmons, R. A., 21
Empetrum nigrum, 219
Endothia parasitica, 62
Endowment Increment Fund, 43
Epigaea repens, 110
ERB, 34, 37
Eriocaulon, 107
Evans' Gardens, 122
Evolution Exhibit, 102
EWB, 34
Exhibit, Evolution, 102
Exhibition, Special Library, 125
Exhibits, 89, 119
Experiments, Demonstration, 233

Fall Bloom, Late, 26
Farmingdale Iris Garden, 59
Felt, E. P., 21
Fence of White Oaks, Boundary-line, 221
Fern Journal, American, 131
Society, American, 131
Collection, American, 129
Field Instruction, Restrictions Concerning, 235
Trips Conducted, 163
Financial, 42
Statement for 1935, 133
Flower Days, 87, 252
Game Booklet, 246
Show, International, 32, 119
Forest Pathology, 62
U. S. D. A., Division of, 64
Free, Montague, 32, 123
Frothingham, John Whipple, 39
Fund, Endowment Increment, 43

Gager, C. Stuart, 45, 168, 173, 185
Galapagos Islands, 17
Garden is Doing for the City, What the, 14
Gaultheria procumbens, 222
Gaylussacia baccata, 223, 224
brachycera, 106
dumosa, 224
frondosa, 224
Genetics, 17, 166
Gifts, 41, 119
Received During 1935, 141

Girls Commercial High School, 42
Graduate Students and Independent Investigators Enrolled During 1935, 59
Graphium ulmi, 19
Graves, Arthur Harmount, 33, 62, 91
Gray, Harvey, 60
Greenhouses, Instructional, 254
Guide Books, 246
Gundersen, Alfred, 75, 102

Hamden Plantation, Diseases at, 70
Harper, Roland M., 106
Hartstongue, 132
Hempstead Plains, 210
  a natural prairie, Preceding p. 207
Herbarium, 30, 108, 253
  Accessions and Distribution, 111
  for 1935, Report of the Curator of The, 105
  Material Borrowed for Study, 110
  Loaned, 111
Horticultural Section, 22, 35, 116
  Society of New York, 33
Horticulturist and Head Gardener for 1935, Report of the, 115
Hudsonia, 110, 213, 214
Hunter, William T., 33
Huntington Botanical Garden, 122
Huxley, Professor, 27
Hydrangea quercifolia, 107
Hypericum, 107

Imponderables, 44
Increment Fund, Endowment, 43
Information, Bureau of Public, 91, 233
  Circulars of, 245
Instruction, Courses of, 234
Investigation, 244
  Independent, 245
Investigators Enrolled During 1935, Graduate Students and Independent, 59
Iris, 59
  Bearded, 103
  Garden, Farmingdale, 59
  Japanese, 104
  Miscellaneous, 104
  Thrips Control, 61

Jackson bequest, Edward, 43
Japanese Garden, 25, 116, 250
  Beetles, 117
Jenkins, R. C., 37
Jennison, H. M., 107
Juglans cinerea, 226
  nigra, 226

Kilpatrick, Van Evrie, 33

Labels and Signs, 104
Laboratory Building, 254
Lawton, Elva, 59
Leaflets, 17, 166
Leitneria floribunda, 99
Liatris, 106
Lantern Slides, Loan Sets of, 233
Library, 29, 254
  for 1935, Report on the, 123
  Statistical Report on the, 129
Lilac Area, 116
Lilacs, 99
  (Syringa), Classified List of, 99
Lilium superbum, 107
Liming, O. N., 21
Linnaea borealis, 110
  var. *americana*, 219
Linnaeus, 27
Liriodendron, 220
Loans, Interlibrary, 128
Loan Material, Study and, 231
Local Flora, 35
  Section, 108, 250
Loines, Hilda, 33
Long Island, The Early Vegetation of, 207
Lonicera japonica, 218
Lupinus perennis, 110
Lygodium palmatum, 106

Magnolia Kobus, 99
  macrophylla, 106
Map of the Garden, 246
Marcy, D. Elizabeth, 55
McArdle, Mary, 98
McCallum, John, 104
Medicinal Plant Garden, 24, 35
Meetings of Organizations at the Garden 1935, 163
Members and the General Public, Courses for, 236
  List of, 193
Membership, 39
  Information Concerning, 10, Preceding p. 11, v
  Privileges of, Preceding p. 11, vi
  Out-of-Town, vii
  Summary of, 206
Memoirs, 17
  Contributions and, 167
Meridian Panel, 255
Meurlin, Marion L., 81
Miner, Frances, M., 41
Monarda didyma, 107
Morus alba, 208
  multicaulis, 208

rubra, 208
Moses, Robert, 37
Mulford Expedition, 17
Myrica carolinensis, 216, 222

Narcissus, 104
Needs, 44
Nephrolepis, 131
Nevinsia, 106
New Jersey College of Agriculture, 32
Newland, D. H., 25
Nicotiana tabacum, 78
Nurses, Course for Student, 85, 244
Nyssa sylvatica, 220

Oak on Long Island, Largest, 90
Oat Hybrids, Experiments with the Fourth Generation of, 52
Third Generation of, 50
Organizations, Meetings of Outside, 234
Orontium, 106

Parks, Department of, 31, 119
Patrons, The Public's Obligation to, 18
Perkins, Mrs. Charles E., 39, 40
Personnel, 39, 115
Petry, Loren C., 169
Photographic Work, Report on, 165
Photographing, Painting, and Sketching: Regulations Concerning, viii
Pine barrens, 211, 217
Long Island, 215
(*Pinus rigida*), 217
at Coram, Long Island, 214
Pinus echinata, 105
rigida, 217, 219
at Coram, Long Island, Pine barrens, 214
Pine barrens, 217
Plantations, 19, 248
Plant Diseases, Cost of, 22
Pathology, 45
Plants for 1935, Report of the Curator of, 99
Statistics Relating to Living, 103
Pogonia ophioglossoides, 110
Polygala polygama, 212
Postcard Bulletins, 91
Postcards, Souvenir, 246
Potamogeton, 105
Pounds, Lewis H., 42
Press Releases, 245
Private Funds, Tax Budget and, 44
Prospectus: 1936–37, 229
Prunus maritima, 226
serotina, 226
virginiana, 226
Publications by the Botanic Garden Personnel During 1935, 150
Popular, 245
Public Instruction for 1935, Report of the Curator of, 78

Quercus ilicifolia, 211, 213
prinoides, 213
Quince, Flowering, 26

Radio Talks by the Botanic Garden Personnel During 1935, 161
During 1935, 91
Rancho Santa Ana Botanic Garden, 122
Record, Brooklyn Botanic Garden, 166
Reed, George M., 45, 59, 68
Registration, Total, 83
Rehder, Alfred, 102
Relief Agencies, Cooperation with Governmental, 34
Report of the Brooklyn Botanic Garden, 1935, Twenty-fifth Annual, 11
Research, 27
for 1935, Reports on, 45
Resident Investigator (Economic Plants) for 1935, Report of the, 132
(Ferns) for 1935, Report of the, 130
Rhexia glabella, 107
Rhododendron, 106
viscosum, 105
Rock Garden, 251
Rosa carolina, 216
Rose Garden, 117, 251
Rubus Chamaemorus, 219
procumbens, 216
Rudbeckia laciniata var. *humilis*, 107

Salix tristis, 212
Sarracenia, 107
flava, 105
minor, 105
psittacina, 105
School Garden Association, 33
Service, Statistics of, 82
Supply Service, 81
Schools, Cooperation with Local, 229
Talks at, 229, 230
Scolopendrium vulgare, 132
Scolytus multistriatus, 19
Seed and Plant Distribution, 119
Exchange, 113

Seeds for School and Home Planting, 230
Offered in Exchange, List of, 1
Service, World-wide, 15
Sewer Line for the Prospect Park Zoo, 31
Shaw, Ellen Eddy, 32, 98
Silene rotundifolia, 106
Sisyrinchium, 212
Smilax, 107, 218
glauca, 216
Smith, Floyd F., 62
Smut Development, Influence of the Growth of the Host on, 45
Infection, Influence of Environal Factors on Sorghum, 58
Investigations, Sorghum, 55
Smuts, Cultural Characteristics of the Oat, 53
Physiologic Races of the Oat, 48
Studies on the Inheritance of Resistance of Oat Hybrids to Loose and Covered, 50
Sorghum Smut Investigations, 55
Specimens, Determination of, 234
Sphacelotheca cruenta, 55
sorghi, 55
Sponsoring Committee for the Twenty-fifth Anniversary, 183
Stanton, T. R., 49
State Institute of Applied Agriculture on Long Island, 59
Stuartia, 105
Svenson, Henry K., 76, 110, 207
Swamp, Cedar, 220
Syringa, Classified List of Lilacs, 99
Systematic Botany, 75, 76
Section, 115, 249

Talks, Lectures, Addresses, and Papers Given by the Botanic Garden Personnel During 1935, 154
Tanaka, S., 68
Tax Budget and Private Funds, 44
Teachers, Courses for, 240
Temporary Emergency Relief Administration, 35
TERA, 34
Tercentenary Publication, A Long Island, 207
Teuscher, Henry, 102
Thatcher, Mrs. Edwin H., 39
Thrips Control, Iris, 61
Tilia tomentosa, 90
Tobacco Pharmacology, Coffee and, 78
Trautvetteria, 106
Trees and Shrubs, American Index of Cultivated, 102
Endowment of, 41
Trillium undulatum, 108
Trustees, Officers of the Board of, 190
Twenty-Fifth Anniversary of the Brooklyn Botanic Garden (Commemoration Program), 174

Ulmus parvifolia, 21
pumila, 21
serotina, 19, 116
United States Botanic Garden, 30
University of California Botanic Garden, 122
Ustilago avenae, 46
levis, 46
Utter, L. Gordon, 53

Vaccinium corymbosum, 223
macrocarpon, 223, 224
Oxycoccus, 223, 224
Pennsylvanicum, 223
uliginosum, 223
vacillans, 223
Viburnum rhytidophyllum, 90
Viola pedata, 108, 212
Vitis aestivalis, 224
cordifolia, 224
Labrusca, 224

Wall Garden, 24
Waterlily Pools, 251
Weigel, C. A., 62
White, Alfred T., 15, 39
R. P., 21
Woman's Auxiliary, 39, 192
Works Progress Administration, 35, 38
WPA, 35, 38

Xyris, 107

Yale, Rare Woods sent to, 90
Young, Richard, 15, 41

Zoo, Sewer Line for the Prospect Park, 31

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President
EDWARD C. BLUM

First Vice-President
WALTER H. CRITTENDEN

Second Vice-President
ADRIAN VAN SINDEREN

Third Vice-President
SUMNER FORD

Treasurer
EDWIN P. MAYNARD

Secretary
JOHN H. DENBIGH

Botanic Garden Governing Committee

MISS HILDA LOINES, *Chairman*

PHILIP A. BENSON
EDWARD C. BLUM, *Ex officio*
MRS. WILLIAM H. CARY
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
MRS. LEWIS W. FRANCIS
WILLIAM T. HUNTER
EDWIN P. MAYNARD
ALFRED E. MUDGE

Ex Officio Members of the Board

The Following Officials of the City of New York
THE MAYOR
THE COMPTROLLER
THE COMMISSIONER OF PARKS

GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue: from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 70. Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag oats. 10 pages. 1935.

No. 71. Physiologic specialization of the parasitic fungi. 19 pages. 1935.

No. 72. Reaction of oat varieties to physiologic races of loose and covered smuts of red oats. 15 pages. 1936.

No. 73. Studies of the root nodule organisms of certain wild legumes. 19 pages. 1936.

LEAFLETS. Established, April 10, 1913. Published irregularly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.